



This is a digital copy of a book that was preserved for generations on library shelves before it was carefully scanned by Google as part of a project to make the world's books discoverable online.

It has survived long enough for the copyright to expire and the book to enter the public domain. A public domain book is one that was never subject to copyright or whose legal copyright term has expired. Whether a book is in the public domain may vary country to country. Public domain books are our gateways to the past, representing a wealth of history, culture and knowledge that's often difficult to discover.

Marks, notations and other marginalia present in the original volume will appear in this file - a reminder of this book's long journey from the publisher to a library and finally to you.

Usage guidelines

Google is proud to partner with libraries to digitize public domain materials and make them widely accessible. Public domain books belong to the public and we are merely their custodians. Nevertheless, this work is expensive, so in order to keep providing this resource, we have taken steps to prevent abuse by commercial parties, including placing technical restrictions on automated querying.

We also ask that you:

- + *Make non-commercial use of the files* We designed Google Book Search for use by individuals, and we request that you use these files for personal, non-commercial purposes.
- + *Refrain from automated querying* Do not send automated queries of any sort to Google's system: If you are conducting research on machine translation, optical character recognition or other areas where access to a large amount of text is helpful, please contact us. We encourage the use of public domain materials for these purposes and may be able to help.
- + *Maintain attribution* The Google "watermark" you see on each file is essential for informing people about this project and helping them find additional materials through Google Book Search. Please do not remove it.
- + *Keep it legal* Whatever your use, remember that you are responsible for ensuring that what you are doing is legal. Do not assume that just because we believe a book is in the public domain for users in the United States, that the work is also in the public domain for users in other countries. Whether a book is still in copyright varies from country to country, and we can't offer guidance on whether any specific use of any specific book is allowed. Please do not assume that a book's appearance in Google Book Search means it can be used in any manner anywhere in the world. Copyright infringement liability can be quite severe.

About Google Book Search

Google's mission is to organize the world's information and to make it universally accessible and useful. Google Book Search helps readers discover the world's books while helping authors and publishers reach new audiences. You can search through the full text of this book on the web at <http://books.google.com/>

B

1,021,283

CERTAIN SHELL HEAPS
OF THE
ST. JOHN'S RIVER, FLORIDA
—
MOORE

GENERAL LIBRARY
—OF—
UNIVERSITY OF MICHIGAN.

PRESENTED BY

The author

Aug. 9, 1894

—





CERTAIN SHELL HEAPS

OF THE

46

ST. JOHN'S RIVER, FLORIDA,

(HITHERTO UNEXPLORED)

BY

CLARENCE B. MOORE

examined

Reprinted from the American Naturalist.

PHILADELPHIA.

1894.



PREFACE.

SINCE the explorations were made of which these papers are descriptive, we have passed two additional seasons on the St. Johns of five and seven months respectively, carefully investigating the sand mounds of the river. During this time we have incidentally looked into a number of additional shell heaps and re-visited many of those already described.

Our views have undergone but few modifications. We are now of the opinion that perforated shells found in the heaps owe their condition to birds which, dropping them again in the water, left them to be dredged up with living specimens and carried to the heaps by the aborigines. (First paper, page 921.)

We are still of the opinion that earthenware is absent from many shell heaps of the river, and consider the makers of these heaps to have been ignorant of its method of manufacture, but whether this earthenware came into subsequent use through the slow process of evolution or by importation remains to be determined.

C. B. MOORE.

JULY, 1894.



CERTAIN SHELL HEAPS OF THE ST. JOHN'S RIVER,
FLORIDA, HITHERTO UNEXPLORED.

BY CLARENCE BLOOMFIELD MOORE.

(*First Paper.*)

While the shell heaps of the east coast and of the west coast of Florida have received careful attention, the fresh-water shell deposits of the St. John's River for nearly a score of years have been entirely neglected. In 1875 appeared Prof. Jeffries Wyman's memoir "Fresh-water Shell Mounds of the St. John's River, Florida," embodying in an exhaustive way the researches of the learned author, conducted in person—researches for which his position as curator of the Peabody Museum of Archæology so eminently fitted him. So thoroughly did Prof. Wyman cover the subject, and so conclusive were his deductions that the writer of the present paper would hesitate to attempt any farther work upon the subject were it not that the possession of steam motive power, and the aid of many assistants have put it in his power to explore a large tract of territory hitherto unvisited by any one with a view to the exploration of shell heaps, and to excavate on a scale never before undertaken on the River.

Previous to the work of Professor Wyman, the shell heaps of the St. John's, while their presence was referred to in books of travel, remained uninvestigated by scientists, with the exception of Dr. Brinton. After a personal examination of these shell heaps their construction was attributed by Dr. Brinton to the action of the River (Floridian Peninsula, Page 180). Just how this conclusion was reached is difficult to understand. The writer, in several hundred excavations made in upwards of sixty localities, cannot recall a single one where the agency of man was not apparent. In every excavation of any size, unmistakable traces of ancient fires were discovered, evidenced at times by masses of burnt or calcined shells, and again by layers of shells reduced almost to powder by the

action of the flames. In addition to this, but less evenly distributed throughout the shell heaps, were fragments of pottery and implements of bone, stone and shell.

To Prof. Wyman then belongs the credit of the demonstration beyond question of human agency in the origin of the fresh-water¹ shell heaps of the St. John's.

The territory on the River covered by the writer, beginning near Whetstone Point, nine miles north of Palatka, and ending at Turtle Mound,² four miles north of Lake Washington, is about 300 miles in extent, *by water*. (Note A). So devious is the river above Lake Harney that no map attempts to outline its twists and looped-shaped bends, and only estimates as to distance can be made. South of Lake Harney the solid land virtually ceases, and the river from a few feet in breadth at times broadens into great lagoons, or never-ending marsh. At every point where a landing can be effected in high water, or where the palmetto can be seen, is a shell deposit made of the debris of the meals of the aborigines. It is with these swamp shell heaps that these papers will have principally to do, since they are of greater interest, not alone through absence of all exploration hitherto, but also because their contracted space more richly rewards investigation.

The shell heaps of the St. John's are refuse heaps simply, and in them refuse alone can be expected under ordinary circumstances; but as articles of value sometimes find their way into ash heaps and dumping places at the present day, so, at times, do weapons and implements, unbroken and in good condition, come to light in the shell heaps. These heaps frequently attain enormous size. Bluffton, the property of Mr. William E. Bird, has thirty acres³ in shell, and in one part

¹It will be remembered that large deposits of marine shells, principally of the oyster, exist at Mayport, near the mouth of the St. John's. These shell deposits will not be discussed in these papers, and all allusions to shell heaps will have reference to fresh-water shell heaps alone.

²Another mound of this name is situated near New Smyrna on the east coast.

³Mr. Chas. H. Curtis, Superintendent of the Bluffton grove, informed the writer that of the fenced portion of the property (forty-five acres) two-thirds consist of shell deposit. The writer, after a careful examination, considers the shell deposit somewhat more.

reaches a vertical height of twenty-five feet from the level of the river.

By far the larger portion of the shell heaps is made up from the remains of fresh-water shell fish, while the bones of various edible animals, principally deer, alligator and turtle, and sometimes of man, crushed, split and occasionally charred, are found in them, but in very unequal distribution.

The stand-by of the aborigines was the *Paludina georgiana*, a fresh-water snail. (Note B). Among the shells of this class, sometimes composing a layer of itself, is found the *Ampullaria depressa*, a snail of great size. The *Unio* (mussel) at times forms a fair percentage in the heaps. The *Glandina truncata*, a land shell, is occasionally met with, while various marine shells from the coast are of not infrequent occurrence.

Prof. Wyman has called attention to a certain difference in size in favor of the *paludinæ* and *ampullariæ* of the shell heaps over those found in the river and its tributary streams at the present day. To this matter the writer has devoted careful attention, and has succeeded in finding *paludinæ* and *ampullariæ* in the shell heaps far larger than any modern shells of the same variety and greatly exceeding in size, so far as the *ampullariæ* are concerned, the measurements given by Prof. Wyman of those from shell heaps. (Note C). As to *paludinæ* no statistics are furnished by him.

Stratification in the shell heaps is of course a matter of accident. The aborigines doubtless made use of the species of shell fish for the time being the most abundant, and such layers are of necessity local and not traceable through the entire heap. The condition of the shells often varies greatly in different portions of the same mound. At times large quantities are found unbroken, without admixture of sand or loam, and so loosely thrown together that they can be literally scooped from the hole; again other portions of mounds are met with where fragments of shell and sandy loam are found in such close connection that the aid of a pick is necessary to effect their removal. It is apparent therefore that some parts of the shell heaps grew up under the aborigines dwelling upon them, and were beaten down and made solid by the press-

ure of many feet for long periods of time, during which periods refuse organic matter was in quantities mingled with the shells; while other parts owe their existence to the dumping of masses of shell by natives not dwelling immediately upon them.

The shell heaps may be divided into four classes in respect to construction :

1. Heaps where shells broken and crushed with a large admixture of sand and loam are closely packed, showing that the mound, by slow accretion of refuse, grew up beneath the feet of the inhabitants.

2. Heaps where unbroken shells with little intermingling of sand lie loosely together, and in which loam is wanting, indicating that the inhabitants living near by carried their refuse to a common dumping place.

3. Stratified heaps, composed of alternate layers of unbroken shells and of crushed shells with sandy loam, testifying that the mound has at different times served as place of residence and refuse heap.

4. Heaps where materials of the first and second classes closely adjoin, leading to the belief that the original heap, used for domiciliary purposes, has been supplemented by a contiguous pile of debris.

To these might be added a fifth class, comprising perfectly symmetrical mounds of shell in the form of truncated cones, possibly constructed from materials of a shell heap for use as ceremonial mounds or as watch towers. Mounds of this class are found at Bluffton and at Huntoon Island, and still await a careful investigation.

No effort will be made to demonstrate the existence of cannibalism among the makers of the shell heaps, as the mass of evidence collected by the writer so entirely corroborates the theory of Prof. Wyman that further discussion on the subject would seem unnecessary. The writer, however, is strongly of the opinion that cannibalism was not practiced by the earliest makers of the shell heaps, for while bones of the lower animals are found at every depth throughout the shell heaps, human bones, treated in a manner similar to those of the edible lower



animals, were not upon a single occasion, among several hundred excavations, met with below two feet from the surface. It will be remembered that upon one occasion only were human remains found by Prof. Wyman at a considerable depth; namely those at Osceola Mound (now Crow's Bluff, Lake County), and that they were not particularly broken. The articular portions of several had been severed by a cutting instrument, a suspicious circumstance. The writer, however, until farther facts are adduced, will remain of the opinion that cannibalism, as a custom, was practiced only towards the close of the period of the shell heaps.

Another conclusion arrived at by Prof. Wyman seems based upon the strongest probability. When after a long and careful search in a shell heap no pottery is brought to light, it may be considered that the makers of the heap lived at a time when the method of its manufacture was unknown. Pottery filled so great a want in the lives of the aborigines and was so extensively used by the makers of the shell heaps where it is found at all, that it seems impossible to account for its absence upon any hypothesis other than the one suggested. One fact relating to pottery which Prof. Wyman neglects to state is that in many shell heaps pottery is found to a certain depth only, after which it entirely disappears. In other shell heaps pottery, plain and ornamented, is found in association for a time, after which unornamented pottery alone is found. These points in connection with the pottery of the shell heaps have been noticed in so many scores of cases that the writer is convinced that many shell heaps were in process of formation contemporaneously with the first knowledge of the art of pottery making and its subsequent development. It will be remembered that Prof. Wyman was hampered in his researches by inadequate assistance in respect to the manual labor of digging, and it is likely that certain facts buried deeply beneath the surface escaped him. It is to be regretted that in nearly every case he neglects to state the *depth* at which weapons and other implements were found, and whether pottery ornamented or plain, or both, was met with in association. It is well known that later Indians occupied the shell heaps as places of

residence long after their completion ; some doubtless cultivating them, and hence distance from the surface is a most important factor in determining the origin of shell heap relics of all sorts.

Before proceeding to a detailed account of certain shell heaps hitherto unexplored, the writer feels it in justice to himself to state that in all excavations conducted by him not one spadeful of debris has been thrown out except in his presence ; that in no case has he relied on hearsay testimony, and that dimensions are derived from measurements, and not from estimate.⁴

LIST OF SHELL HEAPS HITHERTO UNEXPLORED ON, OR NEAR
THE ST. JOHN'S RIVER, FLORIDA.

1. Near Whetstone Point, nine miles north of Palatka, west bank.
2. Shell heap three miles north of Palatka, west bank.
3. Barrentine's, on Trout Creek.
4. Shell Ridge, in swamp half a mile north of Horse Landing, east bank.
5. Shell heap one mile north of Welaka, east bank.
6. Two shell heaps about half a mile apart, right hand side going up Salt Run, Lake George.
7. Shell heap and fields Hitchen's Creek, south of Volusia Bar.
8. Large shell heap in swamp near Morrison's Creek, south of Volusia Bar.
9. Two shell fields near Morrison's Creek.
10. Shell bluff near mouth of Blue Creek, south of Volusia Bar.
11. Shell heap, Duval's, Blue Creek.
12. Mt. Taylor, in swamp east bank of St. John's, one mile south of Volusia.
13. Bird's Island in river, south of Volusia.
14. Small shell heap west bank, opposite Bluffton.
15. Shell heaps, ridges and fields, Tick Island on Spring Garden Creek, near Lake Dexter.

⁴The writer's collection of objects found in the shell heaps may be seen at the Wagner Free Institute, Philadelphia.

16. Shell heap, Spring Garden Creek, east of Lake Woodruff.
17. Mosquito Grove, west bank, four miles north of St. Francis.
18. Shell field on second lagoon south of Hawkinsville.
19. Shell heaps and ridges Thornhill Lake, near Lake Jesup.
20. Huntington's west bank, one mile north of Lake Harney.
21. Small shell deposit opposite Huntingdon's east bank.
22. Shell heap in hammock about two miles east of Cook's Ferry.
23. Shell heap and fields, Raulerson's, southeast end of Lake Harney.
24. Small shell heap in prairie, west bank, about one mile south of Lake Harney.
25. Shell heap in prairie near Econlockhatchee Creek, right hand side going up, about one mile from the St. John's River.
26. Shell heap west side of Puzzle Lake, south of Econlockhatchee Creek.
27. Shell heap about six miles south of Puzzle Lake, west bank of St. John's River.
28. Shell heap about one-quarter of a mile south of preceding.
29. Shell heap in marsh east bank in sight of preceding.
30. Orange mound, about twenty-one miles by water south of Lake Harney.
31. Persimmon mound, east bank near Lake Ruth.
32. Indian fields, Lake Ruth.
33. Rock Island, one mile east of Orange mound.
34. Shell heap on Lake Clement, or Cane Lake.
35. Shell heap opposite above.
36. Paw Paw Island.
37. Long Bluff, two shell Fields.
38. Opossum Bluff, east bank.
39. Mulberry mound, near Lake Poinsett.
40. Half-way mound, between Lakes Winder and Poinsett.
41. Fort Taylor, southwestern end of Lake Winder.

42. Moccasin Island, southeast end of Lake Winder.
43. Turtle mound, four miles north of Lake Washington.

NOTE A.

EXTENT OF FRESH-WATER SHELL HEAPS ON THE ST. JOHN'S.

As stated, the extreme southerly point reached by the writer was Turtle mound, four miles north of Lake Washington. At this point the river is so obstructed by islands, formed from masses of floating plants, that further progress by the channel in any form of boat is impossible between that point and Lake Washington. Row boats, however, by making use of cut-offs, known to natives, can reach the Lake and go beyond without much difficulty. The river extends, after leaving Lake Washington, to a point considerably south of the Sawgrass Lake, and very many trappers questioned by the writer were agreed that shell heaps are met with to the very source of the river and that on them alone can camping places be found among the surrounding marshes. So universal was the testimony to this effect that the writer considers it safe to accept it.

The most northerly fresh-water shell heap is presumably near Whetstone Point, nine miles north of Palatka. Prof. Wyman, though thoroughly acquainted with the river below, failed to find any shell deposits farther north, and the writer during sixteen seasons spent in Florida, of which much time was passed upon the river, has been unable to discover or to hear of any fresh-water shell deposits lower than Whetstone Point. A large number of persons familiar with the river in every capacity have been questioned; some perfectly acquainted with the shell heaps farther south, but no clue as to the existence of more northerly shell heaps has been gained.

Until proof to the contrary be adduced the northern limit of the shell heaps must be considered as stated above. And this gives rise to an interesting question—why on the ninety-one miles of river below Whetstone Point are no shell deposits found? Some of the most advantageous places of abode on the river are met with north of Palatka, while tributary streams are abundant. The writer has found *ampullariæ* at

Magnolia, fifty-three miles from the river's mouth, while shell collectors state that fresh-water snails are sparingly found in tributary creeks near Jacksonville, twenty-five miles from the sea. Beyond this point no data have been obtained. After careful consideration of these facts the writer thinks it probable that the discontinuance of the line of shell heaps was a necessity imposed upon the aborigines through an insufficient supply of their staple article of diet, and that this scarcity arose through a certain admixture of salt water coming with the tide from the sea.

The tide in the St. John's is noticeable as far south as Lake George, and it is stated on competent authority that barnacles are found on pilings at Palatka, hence it is very probable that an admixture of salt water in which only the most hardy fresh-water mollusca can live is met with in the neighborhood of that town. It is also not improbable that conditions now existing at the mouth of the river were not found in earlier times, and that the absence of a bar admitted a greater flow of tide water, in which event fresh-water shell fish within reach of the brackish water would be even less numerous than at present.

NOTE B.

AS TO THE METHOD OF COOKING APPLIED TO SHELL FISH.

The method of preparation of the shell fish as a medium of diet by the aborigines must be considered an open question. Upon no shells at any distance from the various fire places are marks of fire traceable, from which it would appear that roasting was not the method employed.

While boiling would leave no trace on the shells, a question naturally arises as to the method of accomplishment of this form of cooking by those living on certain heaps to whom the manufacture of pottery was unknown. If baskets of wicker or bowls of wood, in which the water was heated by stones previously exposed to the action of fire, were used, such stones would of necessity be comparatively abundant in the shell heaps. But they are wanting.

The theory that the shell fish were eaten without recourse to cooking would seem untenable, since too many shells are found in perfect condition. It is true that a certain proportion of the *ampullariæ* and *paludinæ* (about ten per cent. in some of the heaps) is perforated, and that these perforations were artificially made, since there are no predatory fresh-water mollusks; still it is difficult to see of what assistance such a perforation would be in the extraction of the shell fish without the aid of boiling water. It is therefore apparent that the subject of the culinary methods of the savages⁵ who built the earlier shell heaps of the St. John's—a question never before touched upon—opens a field for careful research.

NOTE C.

SIZE OF THE SHELLS OF THE MOUNDS AS COMPARED TO
RECENT SHELLS OF THE SAME SPECIES.

While the shells of *ampullariæ* and *paludinæ* from certain shell heaps greatly exceed in size those of recent specimens, as the subjoined table, kindly compiled by Mr. H. A. Pilsbry of the Academy of Natural Sciences of Philadelphia, will prove, the shells met with in certain other mounds of the St. John's show little, if any, excess in size over living specimens to be found in the neighborhood. In a number of the older mounds (if absence of pottery be taken as an indication of greater antiquity, and there seems to be no reason why it should not) shells are much smaller than in certain mounds at times but a few miles distant, where pottery is found in abundance. It would seem therefore, that there must have been a middle period when these fresh-water shell fish attained their highest degree of development, and that that period was reached after the completion of certain shell heaps and during the construction of others. Neither Buffalo Bluff, Orange Mound nor the portion of the shell heap on Hitchen's Creek, where very large shells were found by the writer, can be considered as belonging to the older shell heaps of the St. John's.

⁵Lewis Morgan (Ancient Society, New York, 1877) draws the line between savagery and barbarism at the point where pottery comes into use. The distinction is approved by Fiske "The Discovery of America" vol. 1, page 24, et seq.

TABLE OF MEASUREMENTS OF AMPULLARIA DEPRESSA.

Dimensions in Millimetres, 25 equal 1 inch.

LOCALITY.	Height.	Diameter.	Remarks.
Orange Mound.....	80	80	Largest specimen on record.
Buffalo Bluff.....	75	77	
Recent Specimen.....	55	58	Largest in collection Phila. Acad. Nat. Sciences.

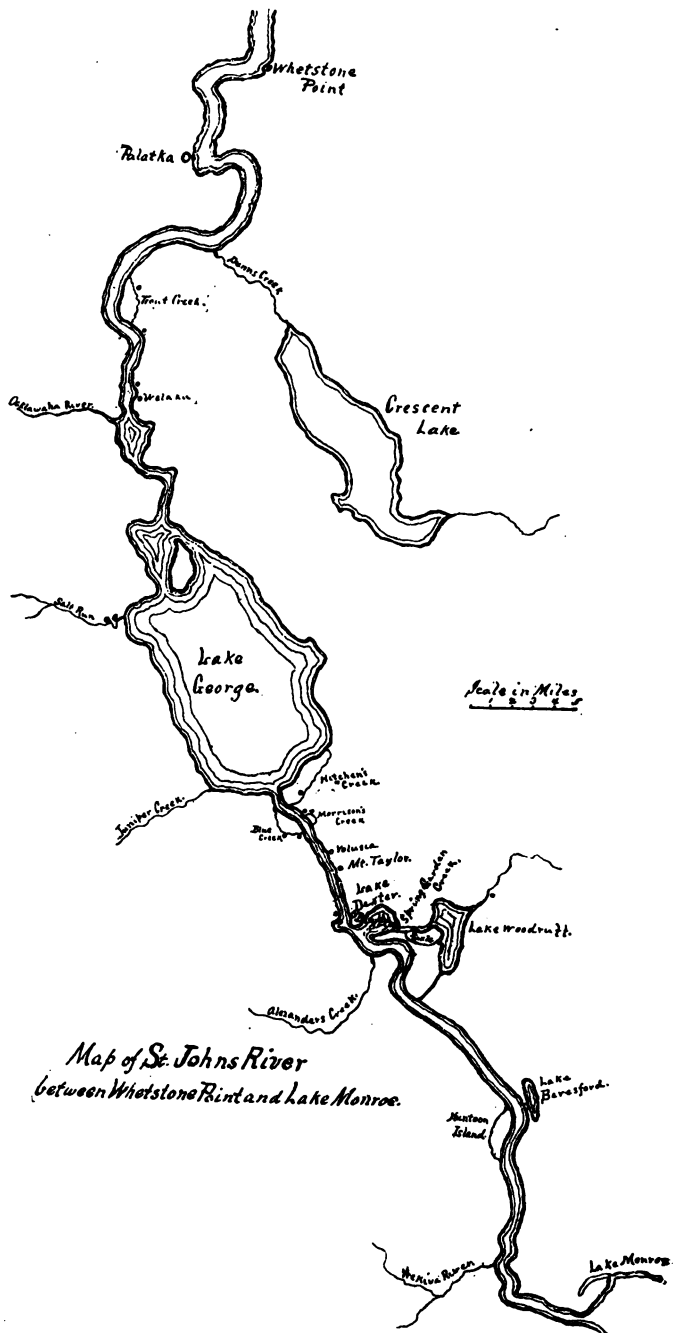
TABLE OF DIMENSIONS OF PALUDINA GEORGIANA.

LOCALITY.	Height.	Diameter.	Height of Aperture.	Remarks.
	50	88	25	Largest specimen seen.
Mound on.....	40	27		Average from 25 meas.
Hitchen's Creek...	45	24	18	Elongated specimens. (Variety <i>Altior</i>).
	42	25	15	
Recent Specimens....	30	23	17	Largest of 200 seen.
Hitchen's Creek.....	27	20	15	Average size.
Recent Specimens....	38	25		Largest recent specimen in collection of Phila. Acad. Nat. Sciences.

It will be noted that the aperture of the shell, in specimens from the mound, measures from one-half to about one-third the length of the shell; but in recent specimens, from the adjacent creek, it is in every case over one-half the shell's length. No living specimens on record attain the size of the average shells of some of the mounds, as will be seen by the figures in the first column.

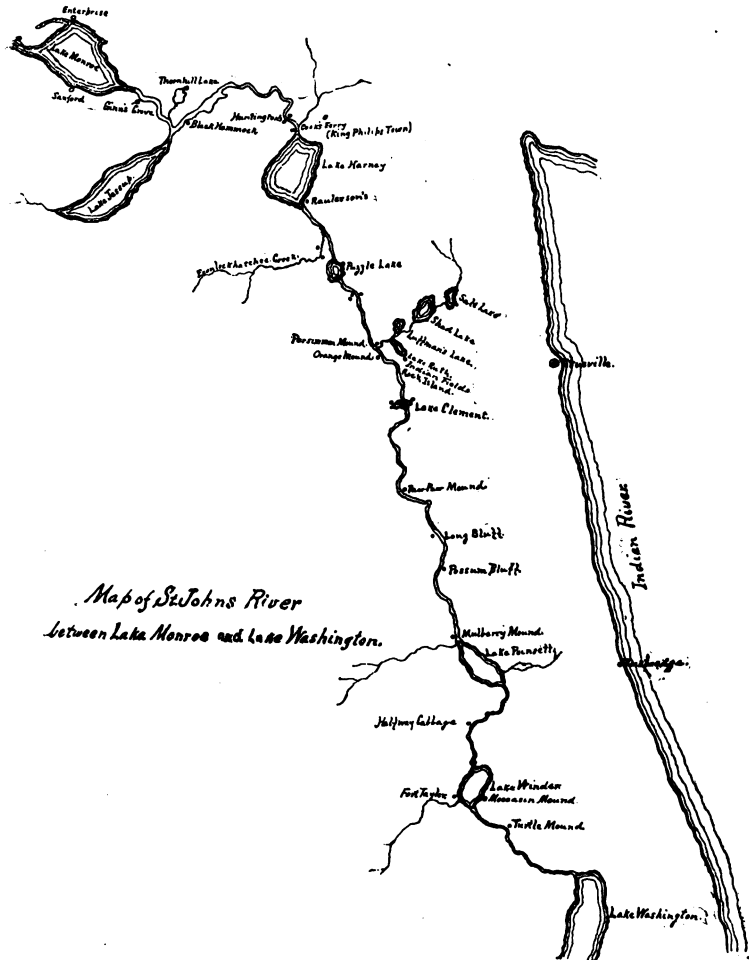
From The American Naturalist, November 1st, 1892.

PLATE XXIII.



*Map of St. Johns River
between Whetstone Point and Lake Monroe.*

PLATE XXIV.



7



CERTAIN SHELL HEAPS OF THE ST. JOHN'S RIVER,
FLORIDA, HITHERTO UNEXPLORED.

BY CLARENCE B. MOORE.

(Continued from November Number, 1892.)

(Second Paper.)

SHELL HEAP THREE MILES NORTH OF PALATKA.¹

This shell heap on the west bank of the St. John's has been largely washed away by the river, and in addition great quantities of its shells have been "lightered" to Palatka for use upon the streets. It was visited by Wyman and by Le Baron² who probably made no excavations, or at all events, did not put them on record. Implements found by them both at this point can be seen at the Peabody Museum, Cambridge.

This shell heap is peculiarly rich in relics of stone and of bone, the implements and arrow-heads being rough and of the shell heap type, a much ruder form than the arrow-head or chisel usually found on the surface throughout Florida. It was twice visited by the writer, who found nothing of interest through excavation, but who, in April, 1892, was fortunate enough to be upon the ground at a period when the river was lower than upon any previous occasion on record, leaving bare a large area usually covered by water and rich in relics washed from the section of the shell heap bordering upon the river. A careful search yielded six bone awls; four other implements of bone; two articular portions of the bone of the deer, separated from the shaft by the aid of a cutting instrument; one flat fragment of bone lined along the entire length,

¹W. W. Calkins (Proceedings of the Davenport Academy of Natural Sciences, Vol. 2, pages 226-227) explored a river mound "north of Palatka," which may be identical with the one under consideration.

²Smithsonian Report, 1882, p. 771 et seq.

with a hole in the center extending almost through; a small piece of greenstone cut into the form of a pyramid, and six arrowheads, one of quite unusual pattern for the St. John's River, though found in some of the Western States⁴ (Fig. 1).

FIG. 1. Size, $\frac{1}{4}$.



Captain Rossignol, formerly in charge of lighters carrying shell to Palatka, presented the writer with a collection of

FIG. 2. Size, $\frac{1}{4}$.



implements found *in situ*, at this place, by him, comprising a number of rude arrow-heads and an implement of chert very

⁴Charles C. Jones, Jr., in "Antiquities of the Southern Indians," describes implements of this character as being broken arrow-heads turned into scrapers. Fig. II, Plate xiv, represents a specimen from Georgia.

roughly wrought on one side, the other being left flat and smooth, recalling the implements of the Moustier Cavern, Dordogne, France (Fig. 2). This shell heap is probably one of the earlier class. A careful search along the entire section of the heap exposed to the action of the river failed to reveal any pottery, and none was met with in digging. Two pieces upon the surface were probably from later Indians. Investigations at this spot, however, were not based upon enough excavations to give a final judgment upon the subject.

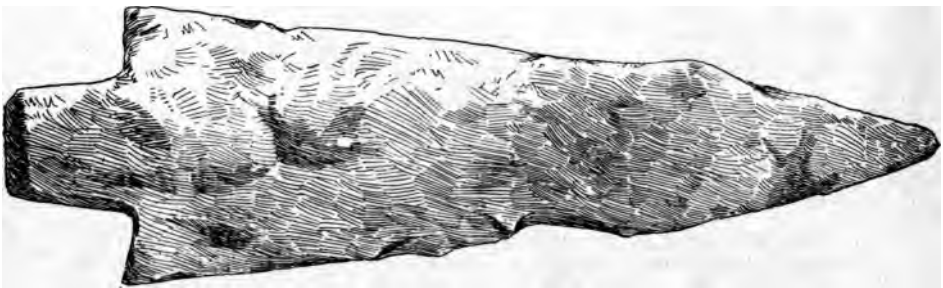
TWO SHELL HEAPS ON SALT RUN.

Salt Run makes into Lake George about two miles southwest of where the St. John's leaves the lake. On the right bank, going up, at a distance of about half a mile from the mouth, is a shell deposit some two hundred yards in length and one hundred yards in breadth, with a height of from four to five feet on the water's edge, increasing to a maximum of ten feet somewhat beyond the middle toward the land. On the same side of Salt Run, about half a mile farther up, is a deposit of shell presenting no irregularities of surface, though varying in depth at different points, owing to unevenness of ground upon which the deposit was made.

EXCAVATION I.

$5\frac{1}{2} \times 5 \times 3\frac{1}{2}$ feet deep; after surface loam no pottery was met with. Fragment of bone awl at a depth of $3\frac{1}{2}$ feet. About three feet down was found, within half a foot of the bottom of

FIG. 3. Size, $\frac{1}{4}$.



the shell deposit, a lance-head of graceful pattern, perfect in every respect; the only lance-head, as far as the writer has been able to learn, ever found at a considerable depth from the surface in any of the shell heaps of the St. John's (Fig. 3). Other excavations yielded nothing of marked interest.

HITCHEN'S CREEK.

At the point where the St. John's River enters Lake George is Volusia Bar. About half a mile south, Hitchen's Creek joins the St. John's on the east side of the river. A short distance above, on the left hand side, going up the creek, are shell heaps and fields under cultivation; in all, about seven acres. A number of excavations yielded the usual bones of edible animals, and showed traces of numerous fire-places at varying depths. In the rear of the dwelling the shell deposit, considerably higher than elsewhere, is closely packed, the shells being crushed to a marked extent and having a large admixture of sandy loam—a "kjökkenmödding." In this deposit, below two feet, no pottery was met with, and the *Paludina* were of small size, in comparison to those of some of the shell heaps. Scattered on the surface were *Paludina georgianæ* of large size, mingled with a *Paludina* previously unknown, *Paludina georgiana*, variety *altior*, Pilsbry.⁵ The portion of the shell deposit, toward the swamp, is composed of unbroken shells, mostly of the two varieties of *Paludina*, of unusually large size and unmixed with sand or loam. Plain pottery is found in great abundance throughout. Water is reached at a depth of two feet. This deposit was probably made by the aborigines living upon the shell ridge adjacent, after the ridge had attained considerable size, since but few of the new variety of *Paludina* were found in the ridge below the surface and at comparatively little depth.

SWAMP SHELL RIDGE NEAR MORRISON'S CREEK.

About three miles south of Volusia Bar, Morrison's Creek, a "cut-off," divided from the St. John's by an island, enters the

⁵The Nautilus, April, 1892, p. 142, et seq.

river. Below this point, in the swamp, entirely surrounded by water when the river is high, is a ridge of shell running north and south, 350 feet in length, with a maximum breadth of 180 feet. The southern extremity, the lowest portion of the ridge, is from $4\frac{1}{2}$ to 6 feet in height; while the northern end attains a maximum elevation of 11 feet, 10 inches, above the level of the swamp when dry. Two excavations, 8×5 feet; $4 \text{ in.} \times 9\frac{1}{2}$ feet deep and $7\frac{1}{2} \times 4 \times 6$ feet deep, were made. Two or three bits of rude, plain pottery were met with, but none at a greater depth than two feet from the surface. Just below the surface a human humerus was found, and a human vertebra at a depth of one foot. A fire-place was at the same depth but at a distance from the vertebra, which showed no marks of fire. At a depth of four feet was found a triangular implement of shell; while 4 feet, 8 inches, down, immediately upon a fire-place, were two rude arrow-heads, one with ashes upon it. Animal bones, disconnected, mainly of the alligator, the turtle and the deer, were encountered throughout.

MT. TAYLOR.

This great swamp shell ridge,⁶ the highest fresh-water shell deposit on the St. John's River, lies on the east bank, 200 yards (paced) from the water's edge. It is about one mile south of Volusia, and in dry seasons can be reached from the river by wading through the swamp; though access from dry land in the rear, about forty yards distant, is advisable. Under any circumstances, the services of a guide are a necessity. This shell heap is not referred to by Le Baron, nor is it particularly mentioned by Wyman, who could not have failed to describe so remarkable a heap, had it been accorded a visit. On page 44 of his memoir, *Fresh Water Shell Mounds of the St. John's River, Florida*, "two mounds, right bank, between Lake Dexter and Volusia," are included in the

⁶The thanks of the writer are due to Mr. William Edgar Bird, of Brooklyn, for much information and valuable assistance, and for most cordial permission to prosecute investigations on every portion of his 5000 acres lying between Lake Dexter and Volusia; including the great shell heaps and sand mound of Bluffton, in addition to Mt. Taylor and other shell heaps in the swamp.

list of shell heaps. This somewhat indefinite description would seem to indicate that his knowledge of the existence and location of Mt. Taylor was based upon information derived from others and not personally verified.

Mt. Taylor, standing alone in the swamp, which at high water is covered to a depth of $1\frac{1}{2}$ feet, rises abruptly on every side, the ascent of one portion being at an angle of 40° . The maximum height of the ridge is 27 feet, 2 inches; its length at base 500 feet, with a maximum breadth of base of 175 feet. An almost level plateau on the summit has a length of 266 feet, with a maximum breadth of 80 feet. The mound is overgrown with palmettoes, palmetto scrub, live oaks and cedars. It lies longitudinally east and west, and is composed almost exclusively of Paludinæ of a smaller size than those of many of the later shell heaps. With the exception of a few fragments on the surface, no pottery was found in any portion of the heap, while implements of any description were of infrequent occurrence in the various excavations. As a rule, it may be said, the older the shell heap, the fewer relics are met with, though weapons of stone exist at all depths, even in mounds which contain no pottery, and in others below the level at which fragments of pottery are found.

(To be continued)

7

CERTAIN SHELL HEAPS OF THE ST. JOHN'S RIVER
FLORIDA, HITHERTO UNEXPLORED.

BY CLARENCE B. MOORE.

(Continued from January Number, 1893.)

(Second Paper.)

West end of ridge on summit, $7 \times 4 \times 7\frac{1}{2}$ feet deep. At a depth of 1 foot 6 inches, an arrow-head with bones of lower edible animals, was found. Two feet down were fragments of turtle shell, and a half a foot lower, a fragment of a bone awl was met with. At 5 feet, 6 inches, from the surface was a well defined fire-place, with bones of the turtle. The shells are almost exclusively *Paludinæ*, with occasional *Unionidæ* and few *Ampullariæ*.

EXCAVATION II.

North-east side of mound about ten feet vertically from the base. Besides the usual fire-places and bones of edible animals, a fragment of a *Fulgur* was found at a depth of four feet.

EXCAVATION III.

On summit near center of ridge, $9 \times 9 \times 11$ feet deep. No clearly marked strata were met with, the excavation being carried through shell with a considerable percentage of broken shell and sand. The following objects were found ;—flint flake at a depth of 6 inches ; fragment of bone awl 1 foot down ; small pendant ornament of shell $1\frac{1}{2}$ feet from surface, (Fig. 4)

FIG. 4. Size, $\frac{1}{4}$.



with bone implement; shell gouge (broken) 2 feet down; rude arrow-head on fire-place, $4\frac{1}{2}$ feet down; flint flake 5 feet down; arrow-head lying on fire-place, at a depth of $6\frac{1}{2}$ feet from surface; portion of arrow-head on fire-place, bearing marks of fire at a depth of 8 feet; fragment of bone awl 9 feet 9 inches down; rude bone awl 10 feet down; bones of edible animals, mainly of alligator, deer and turtle, at all depths.

EXCAVATION IV.

At margin of base north-east portion of mound. Trench $11\frac{1}{2} \times 10 \times 6$ feet deep at end. A piece of coquina, smooth on one side, evidently used for polishing, at a depth of $2\frac{1}{2}$ feet, and a fragment of arrow-head with the usual bones of edible animals, were the only objects of interest met with.

As before stated, absolutely no pottery was seen in the excavation, and this, with the 600 feet of swamp between the mound and the river, would argue for Mt. Taylor a place among the earliest shell heaps of the St. John's. It was the habit of the builders of the shell heaps where solid ground was to be found, to locate their refuse heaps upon it, and it seems unlikely that a spot so far distant from the river's edge as is Mt. Taylor to-day, should have been selected. It is a much more likely hypothesis that the swamp is the result of a change of channel in the river, and has formed since the abandonment of the mound. Professor Wyman has graphically described in his memoir (page 83 et. seq.) the manner of formation of similar swamps. The time required to transform a portion of the river into swamp-land, the writer of this paper believes to be somewhat less than is generally supposed, owing to the great abundance of floating vegetation upon the river. At Little Orange mound, opposite Lake Dexter, is a steam boat wharf in use within eight years, according to the owner of the place. At present, masses of vegetation extending some distance into the river have made access impossible for a boat of any draught, and are speedily forming the nucleus of a future swamp.

Assuming this hypothesis of the formation of the swamp after the completion of the mound to be correct, an indication

of minimum age may be obtained in the case of Mt. Taylor through the size of trees growing between it and the water's edge. Between it and the river grow two cypresses, respectively 14 feet in circumference four feet from the ground, and 19 feet, 3 inches, 5 feet from the ground; while a little to the north-west of the mound in the swamp grows a cypress 23½ feet in circumference at a height of 5 feet from the ground. The cypress is a tree of slow growth, by some being placed next to the live oak in this respect.

Another point illustrated by Mt. Taylor is that neighboring shell heaps are by no means of necessity contemporary. In close proximity to it in the river, is Bird's Island,¹ covered with a shell deposit between five and six feet in thickness. Throughout this deposit to the very bottom unornamented pottery is found in great abundance. North of Bird's Island, on the western bank of the river, is the shell bluff described by Professor Wyman (Note A.). This shell bluff, by the absence of pottery and the small size of its *Paludinæ*, differs widely from Bird's Island, and is probably contemporary with Mt. Taylor.

Just what impelled the makers of Mt. Taylor to pile the debris of their meals to such a height and at such an angle it is impossible to surmise. No ridges of shell led to it, while no shell fields surround it, and it is evident that great care was taken looking to its isolation and to give to it its height and shape. In comparison with the shell deposits of Huntoon Island, of Bluffton, of Silver Spring (Lake George), of Tick Island and other localities where the shell deposit, though large, is spread over great areas and not piled at a single spot, the contrast² is especially striking.

SHELL DEPOSIT OPPOSITE BLUFFTON.

On the west bank of the river, opposite Bluffton, is a level deposit of shell bordering the water. About fifty yards inland is a small symmetrical mound, not over three feet in

¹The *Paludinæ* on Bird's Island, it may be remarked, are far larger than any found at Mt. Taylor; well illustrating a point stated in the preceding paper that shell fish of the St. John's had a middle period of increased development, and a subsequent relapse to their earlier condition.

height, composed of the same material as the shell deposit, namely shell and powdered shell. An excavation was made in the center of the mound, and within a foot of the surface were found various parts of a skeleton, apparently of a woman. The jaws and all other facial bones were missing, as were one femur, one humerus, both tibiæ and all bones of the feet. Many of the bones had fractures not caused during the excavation, the area of the fracture being of the same color as the remainder of the bone. With the remains were several bits of pottery which seemed to be wanting in the mound, save in association with the bones, and this fact would indicate a burial, as would the symmetrical shape of the mound. The fractures can readily be explained by the proximity to the surface, where the tramping of feet could without difficulty separate and fracture the bones. On the other hand, the absence of so many important bones—for which very careful search was made—would seem to indicate that the entire body was not placed within the mound. The various conflicting facts connected with this case offer one of those questions, unfortunately without solution, which from time to time confront the explorer of the shell heaps.

Near this point Mr. Dease, of Volusia, found a small earthenware bowl clinging to the roots of an overturned palmetto, and presented it to the writer.

NOTE A.

AS TO A NATURAL ORIGIN OF ANY OF THE FRESH-WATER SHELL HEAPS OF THE RIVER.

It will be remembered that at the time when Professor Wyman wrote, the agency of man in connection with the shell heaps of the St. John's was nowhere admitted. It is therefore quite natural that taking the initiative in this matter he should have been averse to making any sweeping assertions. There is, however, little room to doubt that all the shell heaps are the work of man. Of the shell bluff near Astor, (Fort Butler) he says² (page 38) "taken by itself, in view of the

² *Op. cit.*

absence of human implements we should hardly feel justified in saying that it was made by man; though in its general features it resembles his work." At the base of this bluff the writer picked up a chisel of shell, and, what is more conclusive (since objects not in place prove but little) a clearly defined fire-place was discovered at a depth of four feet from the surface. It is perfectly safe to say that no fresh-water shell heap can be found on the St. John's River where a careful search would not reveal unmistakable evidences of human agency in its origin.

CERTAIN SHELL HEAPS OF THE ST. JOHN'S RIVER,
FLORIDA, HITHERTO UNEXPLORED.

BY CLARENCE BLOOMFIELD MOORE.

(Continued from February Number, 1893.)

(Third Paper.)

TICK ISLAND (VOLUSIA COUNTY).

Tick Island can be reached by entering Lake Dexter at its union with the St. John's (see map with the first paper of this series), and continuing across it and along Spring Garden Creek, a distance of about four miles in all, until a landing is reached on the southern side of the creek. The island was entirely unknown in connection with scientific research until visited by the writer in February, March and April, 1891. Other visits were made in January, 1892, January and March, 1893; in all twenty-two days have been devoted to the shell heaps and burial mound on Tick Island, with a large party of assistants; but so interesting is the place, and so extended the remains left by a race now passed from sight that much still awaits a thorough investigation.

In connection with many acres of shell deposit is an interesting burial mound of sand, described by the writer in the AMERICAN NATURALIST, issues of February and July, 1892. Thirty feet south of the great burial mound is a small mound, six feet in height and 180 feet in circumference, composed of fragments of shell mingled with sand, so closely packed that a pick is necessary for the work of excavation. The mound is covered with palmettoes whose roots, closely intertwined, lend an additional difficulty to the work of the explorer. As to the nature of this mound the writer is undecided.

Somewhat over 100 yards distant from the great burial mound in a northeasterly direction is a crescentic, or rather a

bean-shaped, shell heap 573 feet in length, with a maximum breadth of base of 233 feet. The height is somewhat irregular, averaging about eight feet from the surrounding level, though the shell deposit is found sunk deep into the marshy soil. Excavations at various points yielded nothing of interest.

SHELL RIDGES, TICK ISLAND.

About a quarter of a mile south of the bean-shaped shell heap lie acres of shell ridges inadequately investigated by the writer. Upon one of these ridges are the remnants of a live oak, now destroyed by fire, but growing at the time of the writer's first visit and then measured by him. Taken at a point five feet from the base the circumference was sixteen feet or twenty-three feet, three feet from the base over projecting knots. At a distance of twelve feet from the trunk of this tree an excavation, 7 ft. by 4 ft., converging to a depth of 9 ft., was made. After 1 ft. 6 in. of humus, shell was reached. From the start fragments of pottery were found in great abundance, the ornamented outnumbering the plain. It was rude and thick in character, made from clay through which vegetable fibre, destroyed in the process of baking, had left minute canals. To overcome a too porous character, it had been, previous to baking, thinly coated with clay on the outside. The clay contained no admixture of pounded shell or of gravel, which is rarely if ever met with in the shell heaps of the St. John's. The manner of ornamentation mainly consisted of straight lines in various combinations as shown. Many pieces in addition had indentations in connection with lines, as figured by Wyman; while the marking of others consisted of series of concentric circles of increasing size.

At a depth of 7 ft. 6 in.—a depth sufficient to clearly prove its contemporary origin with the shell heap—was found a fragment of ornamented pottery, with a turned lip,¹ the only

¹By "lip" the writer means a turning out at one point of the upper margin through which fluid may pass, and not a turned rim encircling the pot. Such turned rims are by no means uncommon. It is taken for granted that Professor Wyman meant to express the same idea in the use of the word "lip."

specimen of the sort ever met with by the writer in a shell heap of the St. John's (Fig. 1). Professor Wyman says ("Fresh Water Shell Mounds of the St. John's River, Florida," page,

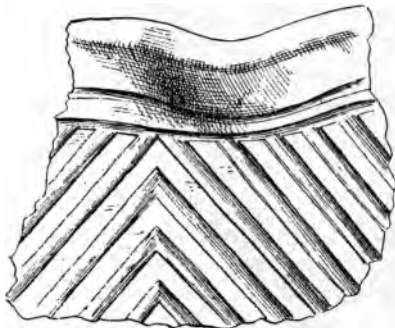
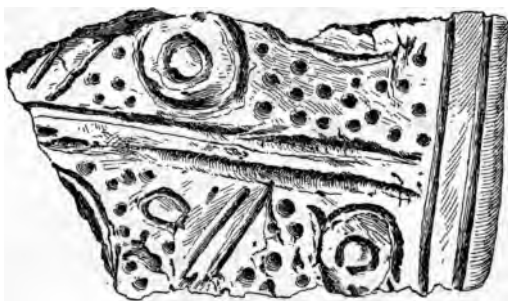


Fig. 1.

Lipped pottery, Tick Island. (Actual size.) The depth of the hole from which it came was such that it must have been superficial, and may have been brought there by the more recent inhabitants. This view is confirmed by the fact that the stamped ornaments were of a different pattern from anything found elsewhere in the mounds, consisting of a series of short parallel ridges instead of squares." Bartram's Mound, or Little Orange Mound, is on the west side of the St. John's, opposite the entrance of Lake Dexter, and is not over five miles distant from Tick Island.

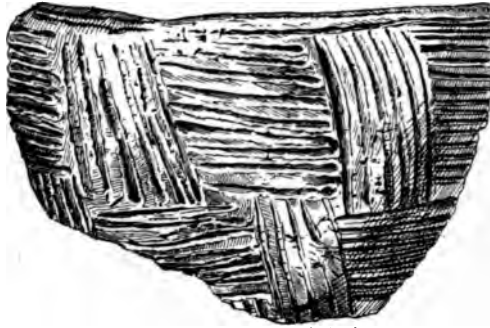
A number of other excavations, some of larger size, yielded



Sherd, Tick Island. (Actual size.)

abundant sherds of like quality and pattern. Tick Island and Orange Mound, to which reference will be made later, are

richer by far in number of sherds and in variety of pattern than any other shell heaps of the St. John's explored by the



Sherd, Tick Island. ($\frac{1}{2}$ size.)

writer who, it may be said, has not confined himself to localities hitherto unexplored, but has carefully gone over those previously described by Professor Wyman, and has (January,



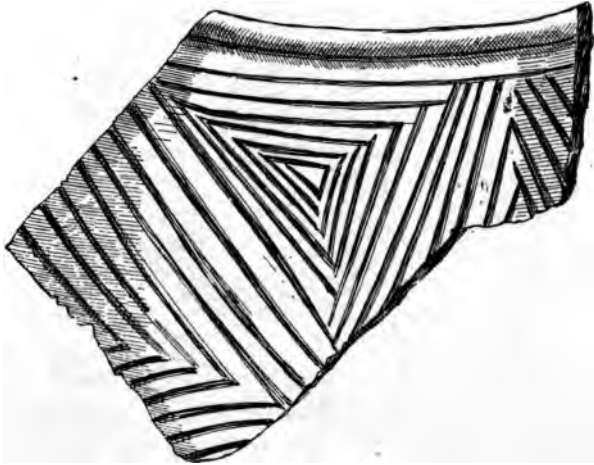
Sherd, Tick Island. (Actual size.)

February, March, April, 1893) extensively explored others previously unreported not included in the list given with the first paper of this series.

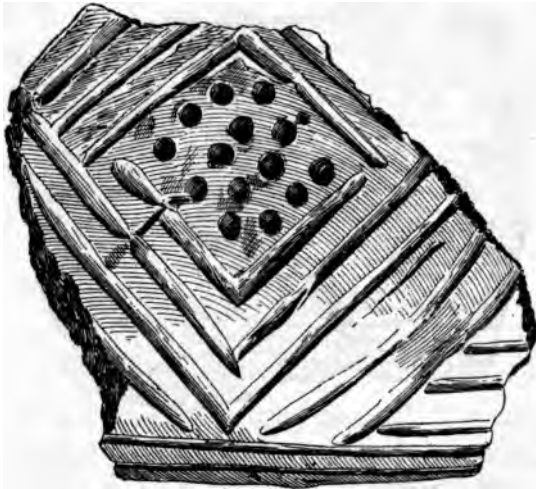
SHELL HEAP NEAR ECONLOCKHATCHEE CREEK (ORANGE COUNTY).

In the prairie about two miles south of Lake Harney, and nearly a mile distant from the west bank of the St. John's, is

a large shell heap covered with palmetto, oak, mulberry and other trees, from many of which hang trailing vines. It



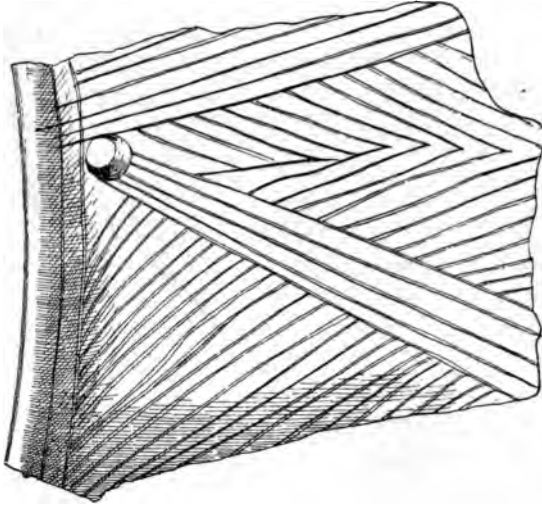
Sherd, Tick Island. ($\frac{3}{8}$ size.)



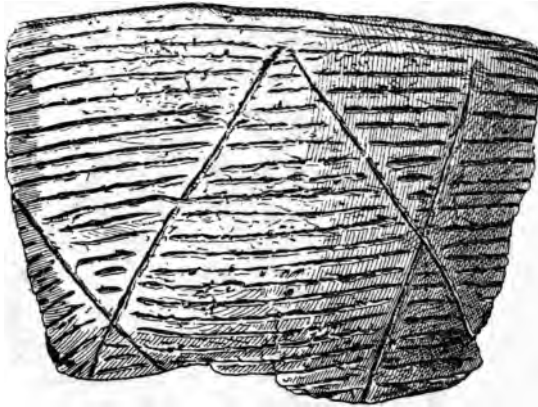
Sherd, Tick Island. (Actual size.)

looms like an island in the prairie which in wet weather becomes a marsh. By ascending the winding Econlock-

hatchee, it is possible to tie up within three hundred yards of the shell heap. Its maximum height is about six feet near



Sherd, Tick Island. (Actual size.)



Sherd, Tick Island. ($\frac{1}{2}$ size.)

the center, from which point it slopes in every direction toward the surrounding prairie.

Excavation I.

At the apex of the mound a hole, slightly converging, 6 ft. by 4 ft. by 7 ft. deep, was dug. Beginning at a level one foot

from the surface and continuing through a layer two feet in thickness, were numerous human bones. These bones were broken into fragments and lay at random throughout the entire stratum. Some were found immediately upon a fire-place, and at least one of these human bones showed marks of fire. They were treated in respect to breakage as were the bones of lower animals found with them, and the areas of fracture were of the same dark brown color as the rest of the bone. The bones were so scattered that any estimate as to the number of bodies represented would be impossible, but fragments of at least four crania were met with. Few fragments of bone were in condition for measurement. The average lateral diameter of three portions of tibiæ was 59.9% of the average antero-posterior diameter. As stated in previous papers, these measurements were taken just where the nutrient artery enters the bone. Of three humeri one was perforated.

Composition of the Mound at Point of Excavation.

(a) 1 ft.—Sand and powdered shell, containing pottery, plain and ornamented, with fragments of bones of edible animals.

(b) 2 ft.—Sand, powdered shell and a slight admixture of shells. Numerous fragments of human bones were found throughout this layer, in association with fragments of animal bones, among which was half the lower jaw of a dog and faeces of animals. At the bottom of this layer, though not covering the entire area, was a fire-place. Absolutely no pottery in this stratum.

(c) 1 ft. 6 in.—Ampullariæ, paludinae and uniones, with slight admixture of sand. No pottery and no bones of animals.

(d) 2 ft. 6 in.—Mixture of sand and shell. No remains of any sort.

In the upper layer were found a small piece of chipped chert, a fragment of a rude implement of bone and a rude disc of shell, rough at the margin and perforated in the center, having a diameter of $1\frac{1}{4}$ inches and a thickness of $\frac{1}{4}$ inch.

In the Report of the Bureau of Ethnology, 1880-1881,

Plate XXVII, fig. 2, an almost exact counterpart of this shell disc is given, with the exception that the perforation is larger and irregular. It is described as one of the stages in the manufacture of shell fish-hooks by the Indians of California; but as fish-hooks of any material are not found in the mounds of the St. John's this disc may be considered a discoidal bead.

A second excavation on the east side of the mound showed, as before, pottery in the upper layer and none in those below. Six fragments of bone were met with, of which two were human.

In this shell heap the hypothesis of burials, even of disconnected bones, would seem untenable, as absolutely nothing found in association with them pointed to interments. A portion of the remains of this probably cannibalistic feast can be seen at the Wagner Free Institute, Philadelphia.

The finding of a bone belonging to the dog is entirely novel in the shell heaps of the St. John's. Professor Wyman's searches yielded no canine remains² nor has the writer hitherto upon any other occasion found, to the best of his knowledge, any portion of the skeleton of the dog in the river mounds. Wyman was aware of no evidence to show the presence of domestic dogs on the river in early times,³ and cites Le Moyne's list of animals supposed to have been seen by the French⁴ (1565), from which the dog is omitted. On the other hand, Cabeça de Vaca, Treasurer of the expedition of Pamphilo de Narvaez (1527), found dogs⁵ among the natives during his wanderings along the coast of northwestern Florida, and in other portions of his journey. He makes no comment as to their origin, as he doubtless would have done had they been pointed out as curiosities, and it is hardly reasonable to suppose that, at so early a period, their derivation can have been from a European source. The bones of dogs are reported from a shell heap at Tampa.⁶ The writer learns how-

² "Fresh Water Shell Mounds of the St. John's River, Florida," page 80.

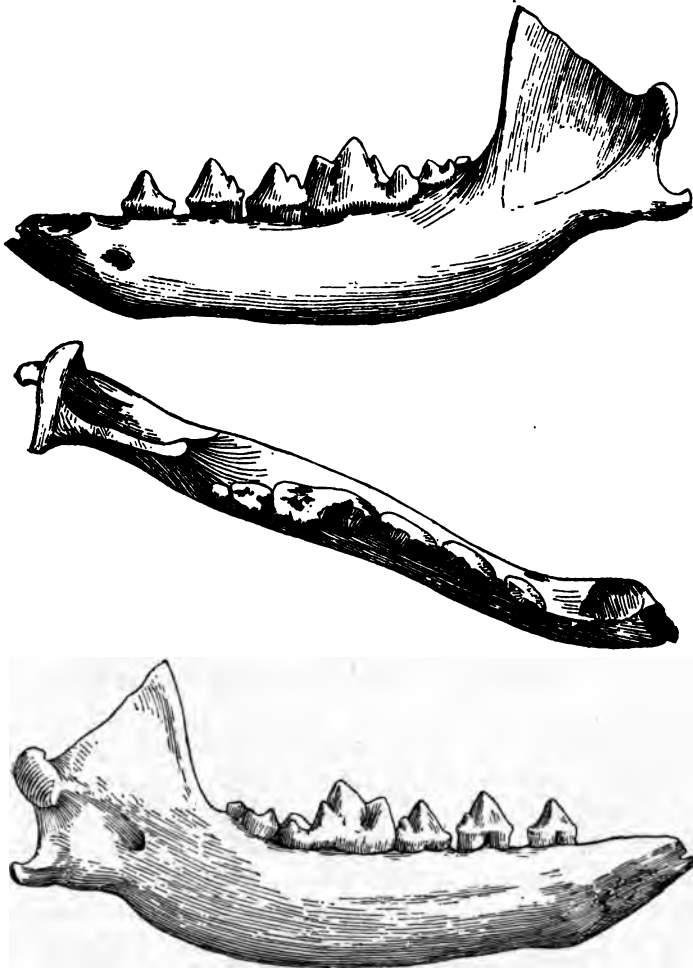
³ Loc. cit.

⁴ Loc. cit.

⁵ "The Narrative of Alvar Nunez Cabeça de Vaca," translated by Buckingham Smith, Washington, 1851, page 41, et al.

⁶ "Tampa Sunland and Tribune," Nov. 18, 1876.

ever that this discovery was superficial. De Soto, who landed at Tampa, had numerous fierce dogs, and found great quantities of dogs among the Indians of Georgia. Bones supposed to be of the dog are in the stone graves of Tennessee.⁷



Lower jaw of dog from Florida Shell Heap, $\frac{1}{4}$.

Dr. Dall regards it as presumable that the coyote has been domesticated along our southern border from time immemorial.

⁷ Dr. Joseph Jones, "Antiquities of Tennessee," page 9.

ial, though perhaps as an occasional curiosity in many tribes, rather than a usual companion. During nine years exploration he found one dog's skull in an Aleutian shell heap, a prehistoric deposit, and only one.⁸

The dog has never yet been found fossil in Florida, though the fossil fauna of the state would suggest its presence.⁹

In view of the fact that but a single fragment of a canine skeleton has been found on the river, and that specimen at no great distance from the surface, it may be well, before arriving at any definite conclusion, to await a farther investigation.

Professor Cope has prepared the following note.

"The lower jaw of the dog found by Mr. Moore presents a number of peculiarities. In the first place, its proportions are not those of either the wolf or coyote. In the next place, the fourth premolar is absent and the short diastema which occupies its place is so much shorter than that which would result were the tooth lost from the jaw of most species and varieties of *Canis*, that it looks as if the absence were normal to the animal, as in the genus *Tomarctus*. This tooth is sometimes wanting in some domesticated dogs, but the deficiency occurs in dogs with convex foreheads, which are the product of much civilization. In the third place, the metaconid is larger than in the wolf or coyote, and the domesticated dogs generally. Finally the heel of the sectorial is peculiar. The entoconid is more conic than usual, and such crest as it develops does not form the outer wall of the heel, but is directed more inwardly than usual.

These peculiarities are remarkable, and render it desirable that more specimens should be obtained. The jaw is not referable to any domesticated species or race with which I have compared it. I, however, have not seen the skull and dentition of the Spanish terrier, which, from its appearance, I should suppose to have originated from an African jackal allied to *Canis mesomelas*, and to have been probably introduced into Spain by the Moors. Some of these dogs may have been introduced into Florida by the Spainards.—E. D. COPE."

⁸ Dr. W. H. Dall, private letter.

⁹ Cope.

ORANGE MOUND (ORANGE COUNTY).

This interesting mound is reached by turning to the west from the river into a lagoon, and continuing about 500 yards after leaving the channel. In a straight line it is ten miles south of Lake Harney, but so devious is the river that three times that number probably would not be an overestimate of the distance by boat, by which means alone can access to the mound be had. Le Baron (Smithsonian Report, 1882, page 102) refers to Orange Mound. He made no investigations and puts the height at forty feet; probably a misprint for fourteen, its maximum altitude. His other dimensions are likewise faulty.

The mound, crescentic in shape, lies north and south. Its length, following the ridge of the crescent, is 560 feet; its maximum width 260 feet. It slopes on every side toward the water and offers usually a secure retreat for numerous large hard-shell turtles which visit it to deposit their eggs. By cutting off their escape to the water, the crew of the writer's boat in one morning secured five, and doubtless the aborigines in the same manner obtained this staple article of diet.

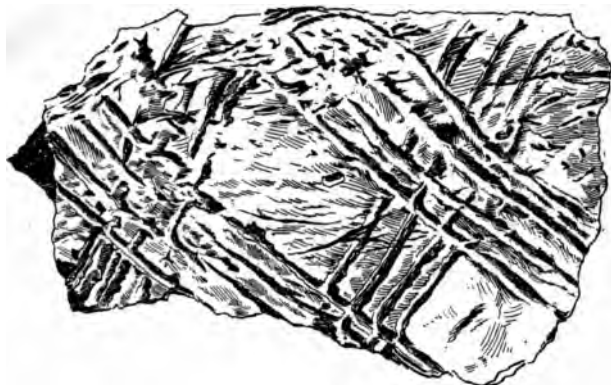
The mound has been under cultivation for the growth of cane, and a tumble-down shed, where once an old caldron stood, is very picturesque, shadowed by towering palmettoes and flanked by a tropical growth of bananas.

Surface pottery is abundant, both plain and stamped in squares. It is of fairly good quality and probably has no connection with the builders of the shell heap. Orange Mound was visited by the writer a number of times during the winter of 1891 and photographs secured; but February 7, 8, 9, 1892 and two days of the winter of 1893 were devoted to serious excavations.

Excavation I.

About the center of the mound at its highest point, 12½ ft. by 8 ft. by 15 ft. deep, converging. The first foot was through a layer of loam filled with pottery of the variety seen on the surface. At a depth of one foot was found a shell chisel,

small and perfect. The next three feet consisted of ampullariæ loosely thrown together, with a slight admixture of sand. Many of these shells were of extraordinary size, among



Sherd, Orange Mound. (Actual size.)

them being found specimens far surpassing all previous records known to science. At a depth of $1\frac{1}{2}$ ft. were clearly defined traces of a fire-place. Through the layer of ampullariæ and in the succeeding stratum, consisting of one foot of brown sand, mingled with ampullariæ, unionidæ and paludinæ, pottery was abundant, thick and coarse in character, with a certain percentage decorated with lines.

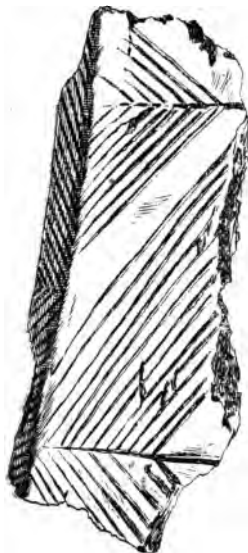


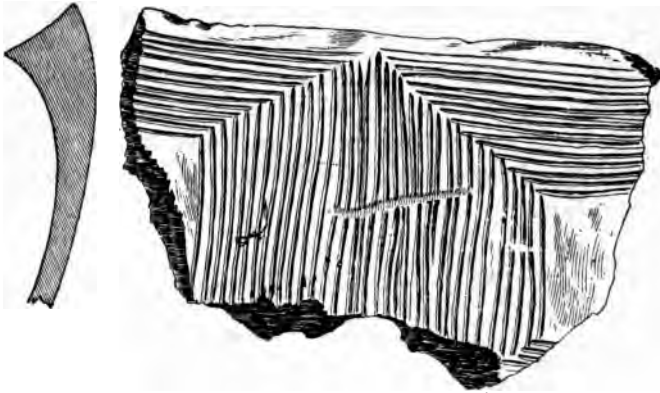
Fig. 2.
Orange Mound. ($\frac{1}{2}$ size.)

In its method of manufacture, namely, the admixture with the clay of vegetable fibre, which subsequent heat had destroyed, leaving the material porous in character, it resembled the pottery of the shell ridges at Tick Island and of some other deposits of the river, some sherds being so much as .7 inch in thickness. The patterns varied considerably as to the arrangement of lines, and in certain ones decorations appeared on the upper margin of the rim (Fig. 2).

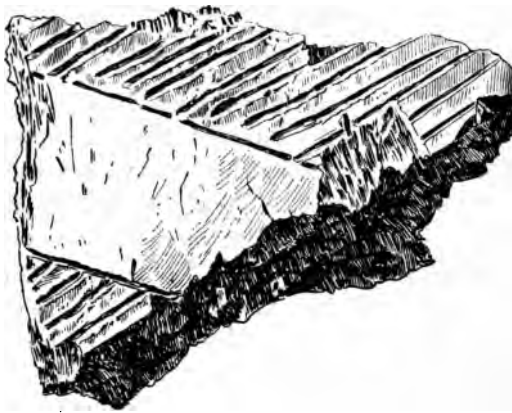
Some fragments with inverted rim were

thickest at the top, the general thickness being .6 inch, thickness of rim 1.2 inches.

At a depth greater than five feet not a fragment of pottery was encountered. Fire-places were found at varying depths, while throughout the entire excavation bones of the turtle,



Sherd, Orange Mound. ($\frac{1}{2}$ size.)



Sherd, Orange Mound. (Actual size.)

deer, alligator and other edible animals were met with. At a depth of $4\frac{1}{2}$ feet, in a layer of brown sand, with a percentage of shell intermingled, strongly reminding the writer of the brown sand layer in the Tick Island burial mound,¹⁰ a num-

¹⁰ AMERICAN NATURALIST, February and July, 1892.

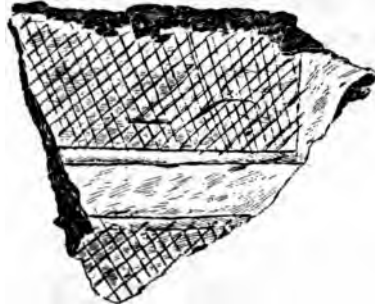
ber of human bones were encountered. They were somewhat disturbed by the digging but were neither crushed nor broken as are the bones of the shell heaps, and it was evident that interments had taken place. Below the bones was a layer of pure white sand, so common in the burial mounds. This stratum seemed to a great extent to be local, being $1\frac{1}{2}$ feet through at the thickest part, namely, the northwest part of the excavation, diminishing on the east and west and being entirely lost on the south. Further investigations showed the white sand layer to decrease in thickness to the north, being but four inches thick at a distance of three feet beyond the excavation.



Sherd, Orange Mound. ($\frac{1}{2}$ size.)

By digging with trowels into the south side of the excavation, in a layer of almost pure brown sand was found the skeleton of a woman, buried at length in a horizontal position in perfect anatomical order. The skeleton as it lay measured 5 feet, $1\frac{1}{2}$ inches in length. The position of the skull was 10° south of west, the feet pointing 10° north of east. The forearm lay across the pelvis. The body had been buried upon its left side and the left leg and arm were missing. It is almost certain, in view of the presence of every other bone of the skeleton, that these members, extending somewhat from the body, unlike the right arm and leg, were thrown out by the spades prior to troweling into the side of the excavation. The skull was somewhat crushed. The femur was $14\frac{1}{2}$ inches in length (tape); the humerus was not perforated. The tibia in lateral diameter was 58.2% of the fore and aft diameter, showing decided platycnemism.

About one foot south of this burial on a line with the ribs was found what was probably a burial of the kind so well known in some of the sand mounds of the river and of the coast, where the body, previously exposed to the ele-



Sherd, Orange Mound. ($\frac{1}{2}$ size.)



Sherd, Orange Mound. ($\frac{1}{2}$ size.)

ments, is denuded of flesh before burial. As a rule, the larger bones are placed in a bundle horizontally and are surmounted by the skull. In this case the cranium lay below the bones. Above it in immediate association were the larger bones of the body. The lower jaw lay about six inches from the upper jaw to one side with the teeth turned away. A few vertebræ were beneath the head, while two heel bones were with the bundle. Upright by the skull was a femur belonging to another body. All these bones were badly decayed

being in a far worse condition than those of the skeleton at length.

To return to the main excavation. Below the layer of white sand were two feet of brown sand and shell intermingled, and beneath this was a stratum 2 feet 9 inches in depth composed of crushed shells with a very slight admixture of sand. At a depth of 8 feet were more human bones disarranged by the digging. At a depth of $8\frac{1}{2}$ feet a cranium was found, with bones of the face missing, except a half of the lower jaw. In



Sherd, Orange Mound. (Actual size.)

association were bones of the lower animals. At the same level as the skull, and where they might be looked for, in anatomical order were pelvis, femur, tibia, fibula and foot bones complete. A femur lay somewhat apart. It is possible that this femur, not in association with the pelvis or with the tibia which was found lying across the first tibia in anatomical order, may have been separated from the skeleton by the shifting of sand caused by trampling in earlier stages of the

mound.¹¹ Between the skull and pelvis lay decaying fragments of ribs. It is probable that the missing arm bones extending upward were those inadvertently disarranged by digging half a foot above.

At a depth of $8\frac{1}{2}$ feet immediately below the bones was a layer two feet, nine inches in thickness, consisting of the ordinary crushed shell of the shell heaps, with fire-places, bones of the lower animals, etc., as ordinarily found. Nothing of further interest was met with.

Diagram of the northern side of this excavation is appended.

A number of other excavations were made in various portions of the mound. No pottery was met with below $5\frac{1}{2}$ feet anywhere near the center of the mound, though near the margin—probably a later deposit—pieces were found at a depth of seven feet. Eighty-eight feet from the first excavation on the northern slope of the mound seven feet below the surface was found a portion of a rude spear head of red chalcedony, $1\frac{1}{2}$ inches in length. In this excavation the *glandina truncata* was comparatively numerous, some thirty or forty specimens being present. This land shell is of infrequent occurrence in the mounds.

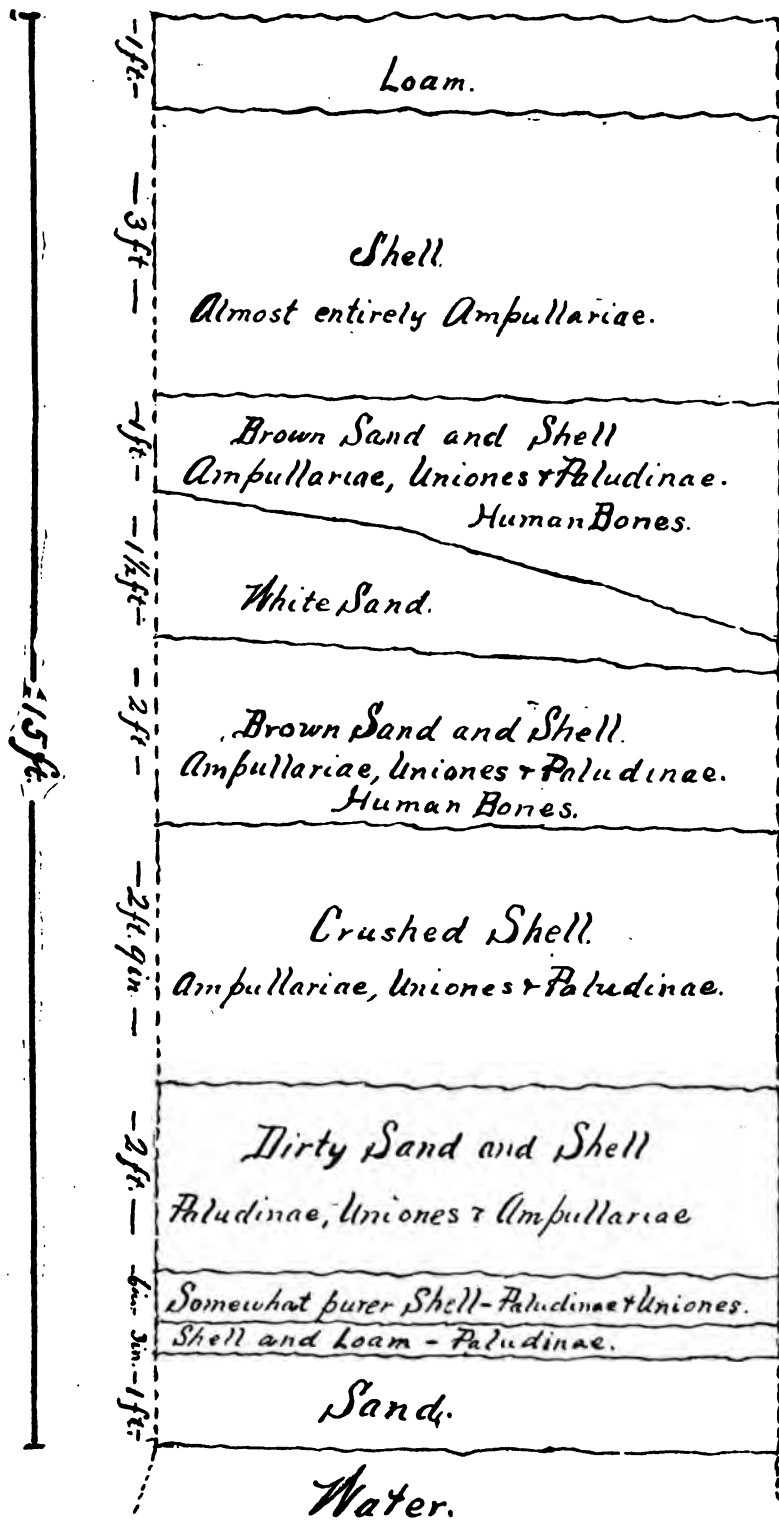
Of the four humeri found during the first excavation not one was perforated. The three tibiae exhumed in a condition for measurement had an average of 58.0 per cent lateral diameter as compared to the antero-posterior diameter. No crania were saved.

To those interested in the archæology of Florida, the result of the investigation conducted at Orange Mound must be regarded as of considerable importance. It will be remembered that to the present time no conclusive evidence has been secured, assigning to any sand mounds of the river an origin contemporary with the shell-heaps. That burials took place at Orange Mound in a regular stratified mound of sand is beyond the shadow of a doubt, and that the burial mound was not made upon an abandoned shell-heap, perhaps long

¹¹ This shifting of bones is not uncommon according to Topinard, *Revue d'Anthropologie*, 1886, page 742.

Section of North Side of Excavation.

Scale- $\frac{1}{2}" = 1'$ Orange Mound, Fla.



after the eaters of shell-fish had passed away, is irrefutably shown by the three feet of *ampullariæ* piled above. It must therefore be admitted that the aborigines of the shell heaps, in one instance at least, interred their dead in a sand mound in every respect similar to many burial mounds of the St. John's, and the writer considers it so unlikely that the stratified burial mound met with in the center of the great shell-heap at Orange Mound is an isolated case in respect to the method of sepulture of the eaters of shell-fish that at least the erection of some of the sand mounds of the river by the men who piled up the shell-heaps would seem to be strongly indicated.

LONG BLUFF (ORANGE COUNTY).

This bluff on the west bank of the St. John's lies directly on the water's edge. It is separated from a large shell-hammock by a quarter of a mile of marsh. This southerly portion probably is considered a part of the Bluff, or at all events has no distinctive name. Long Bluff, unlike most of the shell-deposits south of Lake Harney, is not composed entirely of shell and does not appear to owe its origin solely to the debris of the meals of the aborigines, but consists of sand through which is a sprinkling of shells. It is perfectly level and if cleared of the dense mass of palmettoes which shade it, would be termed a shell-field.

A Cache.

About midway in the northern portion of the Bluff an excavation, the point for which was selected at random, was made, $1\frac{1}{2}$ feet through the sandy loam, with here and there an occasional shell. Beneath was a hard conglomerate of sand and shell, mostly uniones, about four inches in thickness, necessitating the use of the pick. Underneath the shell layer was a pure white sand, continuing to water level. At a depth of eight inches in this sand, or $2\frac{1}{2}$ feet beneath the surface, by good fortune, was found what was probably a cache of one of the earlier Indians. In a space no larger than a man's hat,

in actual contact, lay six chisels or scrapers of shell, each of a different size, 8 inches, $4\frac{1}{4}$ inches, 3 inches, $2\frac{1}{4}$ inches, 2 inches, $1\frac{3}{4}$ inches, in length, respectively; one shell gouge; one spiral instrument for cutting or polishing, $6\frac{1}{2}$ inches in length, made from the columella of the fasciolaria; four bone awls; one curved awl of bone, 4 inches in length; one sandstone hone or whetstone; a large number of the smaller bones of edible animals. (See Plate XVI.)

In order to ascertain whether these relics marked the site of a burial, the excavation was continued until a trench, 15 ft. by 4 ft., 3 in. by 3 ft. to 4 ft. deep, was dug. At a depth of 8 inches from the surface an arrow head was found, and during the course of the digging another hone, an oyster shell and several pieces of lined pottery were met with. There were, however, absolutely no indications of a burial. The chisels were perfect, with one exception, the hone showed no marks of use, and the points of the awls were intact. These relics therefore, are not the debris of the shell heaps, and their number precludes the possibility of an unintentional deposit. With no human bones in association, a cache would seem to be indicated, although the presence of unworked animal bones—unless to serve as material for implements—is difficult to explain.

In the southern portion of the Bluff a number of small excavations were made. Fragments of human bone, with broken bones of edible lower animals were met with.





CERTAIN SHELL HEAPS OF THE ST. JOHN'S RIVER,
FLORIDA, HITHERTO UNEXPLORED.

BY CLARENCE BLOOMFIELD MOORE.

(Continued from July Number, 1893.)

(Fourth Paper.)

Reprinted from The American Naturalist, August 1st, 1893.

CERTAIN SHELL HEAPS OF THE ST. JOHN'S RIVER,
FLORIDA, HITHERTO UNEXPLORED.

BY CLARENCE BLOOMFIELD MOORE.

(Continued from July Number, 1893.)

(Fourth Paper.)

MULBERRY MOUND (ORANGE COUNTY).

By referring to the map accompanying the first article of this series,¹ the reader will see that Mulberry Mound lies on the west bank of the St. John's, just north of the river's exit from Lake Poinsett. Rising abruptly from the water's edge the mound offers the only solid footing for miles around, and upon it the otter hunter on his way up and down the stream finds a welcome refuge. This island mound has been under cultivation in former years, but when visited (February, 1892, and February, 1893) was covered densely with vines, shrubbery and sugar-cane. In all, eight days were spent in investigation with a party of eight workers. The mound extends from S. S. E. to N. N. W. The length of base is 285 feet; its maximum breadth 120 feet; its maximum height from water level at a low stage of the river is 15 feet, 6 inches. Shell continues to an undetermined depth. The mound is unstratified, as a whole, and is composed mainly of uniones with a large admixture of sandy loam, containing occasional *ampullariæ* and *paludinæ*.

At no part of the mound investigated by the writer was there any evidence of the presence of loose masses of shell comparatively unbroken. Abandoned fire places were found at every depth. Upon the surface is a stratum of loam and sand from $1\frac{1}{2}$ feet to $2\frac{1}{2}$ feet in thickness. This layer is probably a formation subsequent to the abandonment of the mound by the eaters of shell-fish, and all articles found

¹ AMERICAN NATURALIST, Nov., 1892.

therein cannot with certainty be attributed to the period of the formation of the shell heap.

To the north of the shell heap is a small burial mound which, through its immediate association with the shell heap, is of the greatest interest. To it a number of additional days were devoted.

Of all the shell heaps of the St. John's, Mulberry Mound most richly rewards archeological research. So distant is the nearest solid ground and so contracted were the quarters of those who raised the shell heap that every article cast away or lost during certainly a very long period is contained within an area a mere fraction in comparison to that of many shell heaps of the lower river.

On the summit of Mulberry Mound, not far separated, three excavations were made: $10\frac{1}{2} \times 7 \times 12$ feet deep; $12 \times 7\frac{1}{2} \times 10$ feet deep; 16 feet, 8 inches by 14 feet, 5 inches by 16 feet deep. All these excavations were subsequently increased in size by the use of the pick upon the sides.

Pottery.

While the sherds found throughout the excavations were of good quality and ornamented fragments of pottery were found even below water level, yet in numbers and in variety of design they by no means compared with the fragments of ruder material so plentifully met with in other shell heaps of the river and notably at Tick Island and at Orange Mound. No sherds were encountered of that coarse and porous material showing original intermixture of vegetable fibre save two or three specimens at the very base of the mound. At a distance of $8\frac{1}{2}$ feet from the surface was a fragment of pottery, colored a bright red, and three other sherds similarly decorated were encountered in various stages of the excavations. While pottery of this character is of frequent occurrence in the sand mounds its discovery is not on record hitherto in the shell heaps of the river. Pottery with stamped decoration, so common on the surface along the St. John's, was fairly abundant in the upper portion of the mound, while specimens were met with at unusual depths, one sherd thus decorated being found

at a distance of 10 feet from the surface. As a rule, the ceramic ornamentation consisted of incised lines, several of novel pattern. One specimen showed interior decoration, the outer surface being plain. Another had been scratched upon the surface subsequent to the completion of the pottery (Fig. 1).

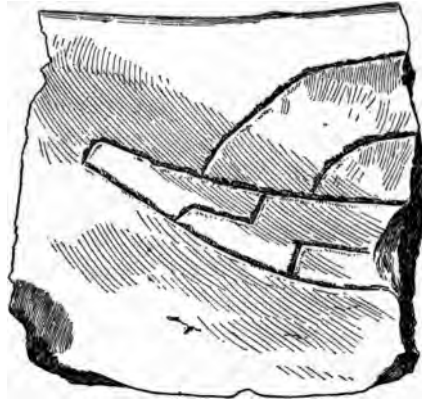


Fig. 1. (Full size.)

Three feet from the surface, in excavation 3, a vessel was uncovered, uninjured, with the exception of a small chipping from a portion of the rim. The material was of inferior quality. Its decoration varied, consisting of lines and dots in various combinations. The body of the bowl was plain. Its diameter at the mouth which was irregular but nearly circular, was from $8\frac{1}{4}$ inches to $7\frac{3}{4}$ inches. Its height was 4 inches. Its average thickness of material was .3 of an inch. In form it resembled a bowl, a common shape in the sand mounds.

Various partially broken vessels were found unornamented and presenting no peculiarity. One contained a mass of unbaked clay.

Nine and a half feet from the surface was found what at the time was considered a fragment of a large bead of pottery (Fig. 2), and not until two similar and more complete objects were met with in the adjoining burial mound (Figs. 3 and 4) was the conclusion arrived at that it was a portion of a tobacco pipe.

It will be remembered that the absence of pipes from the shell heaps was emphasized by Professor Wyman, and the writer, in upward of eighty shell heaps carefully explored, has heretofore found nothing indicating the use of tobacco by the eaters of shell fish, though pipes have been taken by him

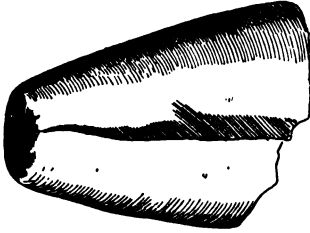


Fig. 2. (Full size.)

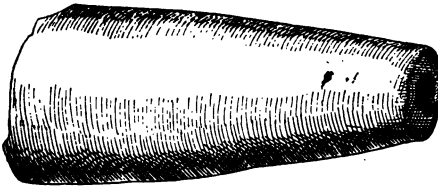


Fig. 3. (Full size.)



Fig. 4. (Full size.)

from the burial mounds. A careful comparison, however, of the figures given herewith should convince the most skeptical that all three are fragmentary parts of vessels used in the smoking of tobacco, and such is the opinion of Professor Haynes who has made a careful examination of the specimens.

During the excavation a mass of baked clay was found bearing the imprint of human fingers.

At a depth of $2\frac{1}{2}$ feet was found a mass of clay about six inches in height, unbroken, resembling half the cast of a pot. It is quite evident that whatever its use may have been, clay could readily have been moulded around it when placed with one of similar proportions.²

² It is possible that the masses of clay referred to by Squier and Davis (*Ancient Monuments of the Mississippi Valley*, page 149) were of similar character.

An Attempt at Delineation.

At a depth of 10 feet from the surface two pieces of pottery in immediate association were thrown out in the same shovel-ful of debris. An investigation showed the fragments, which were covered with the soot so frequently found upon the sherds of the shell heaps, to belong to the same vessel, though the fracture was contemporary with their abandonment in the mound. Upon them was rudely cut a representation of the human figure (Fig. 5).

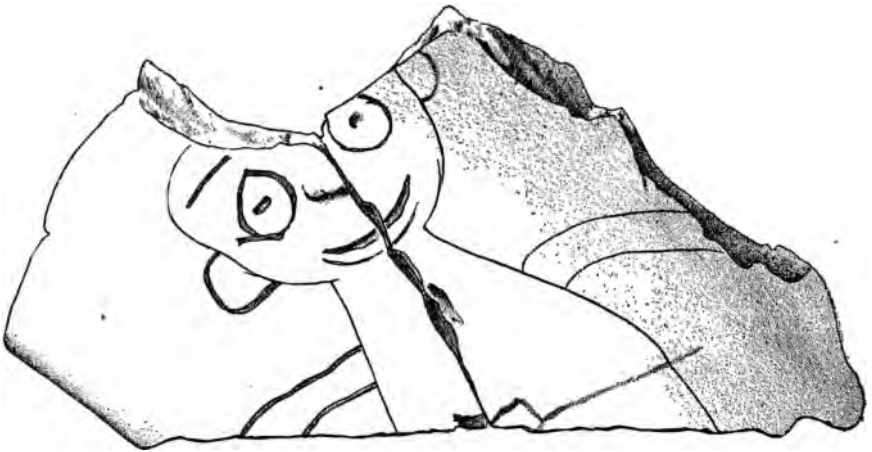


Fig. 5. (Full size.)

The discovery of this attempt at delineation at so great a depth in a shell heap of the river is of peculiar interest, being entirely unique in the extended search of the writer and unreported by others.³

Bone.

Upward of ninety implements of bone, many of which were somewhat fragmentary, were met with in the three excavations. As the depth of the excavations increased implements were found in an inverse ratio. Awls and piercing

³ This aboriginal attempt at delineation may be seen at the Wagner Free Institute, Philadelphia.

implements were numerous. One foot and five feet from the surface were two-pointed implements resembling daggers, respectively $6\frac{1}{2}$ inches and $7\frac{1}{2}$ inches in length (Figs. 6 and 7). Piercing implements of bone of this size are not mentioned by Wyman, nor have they been met with by the writer in any other shell heap of the St. John's, though in the burial mound at Tick Island was found a carefully fashioned pointed instrument of human bone $9\frac{1}{2}$ inches in length, circled at the blunt end by an incised line. On one side were three perforations extending longitudinally below. These long stiletto-shaped implements of bone are not uncommon in other localities. Professor Haynes is of the opinion that they were used in the weaving of baskets.

At a depth of four feet was an implement, in shape resembling a shuttle (Fig. 8), hitherto unreported in connection with shell heaps in the river.

Two slender pins with lined ornamentation around the heads (Fig. 9), 7 inches and 8.2 inches in length, both discovered at a depth of three feet from the surface, though in separate excavations, were found intact, while throughout were numbers of small piercing implements two inches in length and over fashioned from the long bones of small carnivores with the articular portion remaining (Fig. 10). The core of a stag horn was lined with eight parallel circles.

A curious implement, 2.3 inches in length, was exhumed, made from a solid bone, unidentified, having a maximum diameter of 1 inch, polished at the base and drilled to a depth of .9 inch, the cavity diminishing slightly in size from the margin of the orifice inward. The opposite end was beveled on one-half to a central ridge, the other portion being cut down as if to connect with the cavity below. Two longitudinal parallel lines were on either side, while a longitudinal ridge spread out at the upper portion, forming a triangle of which the margin of the top formed the base. Unfortunately a series of figures would be required to represent this curious object.

A portion of the head of a piercing implement, $1\frac{3}{8}$ inches in length was beautifully decorated with lines. Exposure to

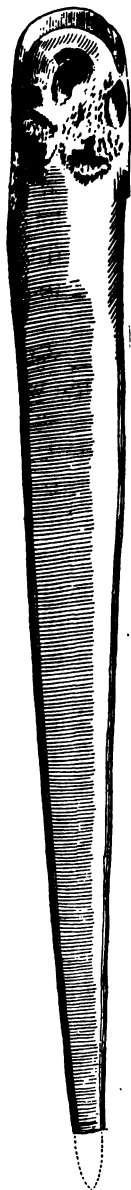


Fig. 6.

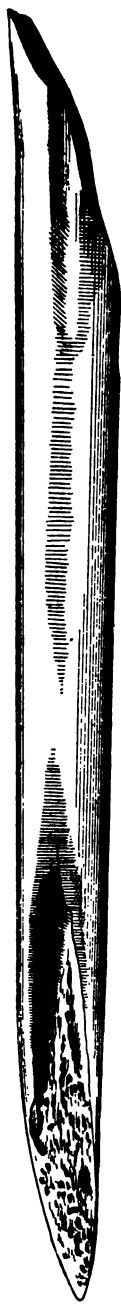


Fig. 7.



Fig. 9.



Fig. 8.



Fig. 10.



Fig. 11.

Implements of Bone. (All full size.)

fire had colored it black and given to the surface a brilliant polish (Fig. 11).

Stone.

Just below the surface loam was a portion of a celt of slate, $2\frac{1}{2}$ inches in length, polished and with ground cutting edge. Its depth does not identify it positively with the shell heap. $1\frac{1}{2}$ feet from the surface was found a "sinker," or pendant ornament,⁴ 2 $\frac{3}{8}$ inches in length, rimmed at either end for suspension (Fig. 12). This interesting relic cannot positively be attributed to the period of formation of the mound. It is probable that later Indians cultivated the mound which, moreover, within recent years has been ploughed to facilitate the planting of sugar-cane.

Two feet from the surface a round sandstone hone was met with.

At a depth of $4\frac{1}{2}$ feet was brought to light a celt of polished shale of rude workmanship, with the portion farthest from the cutting edge roughened, probably for insertion into a socket (Fig. 13). This find is extremely interesting, being the first on record of an implement of polished stone found in a shell heap of the St. John's at a depth to justify the belief as to an origin contemporary with the heap. Among other articles of interest brought to light were a sandstone hone, grooved through the sharpening of pointed implements, and a flat piece of coquina.

At a depth of 14 feet, 8 inches from the surface was found a lance head of fine chert, 3.6 inches in length, thin and of graceful pattern, while 8 inches above were two lance heads of chert, one of beautiful design, barbed and having the base of the tang concave, fully as graceful in design and in finish as any stone point met with on the surface. Its length was 3.8 inches.

Its companion was of coarse yellow chert, with a length of 4.14 inches, and had a natural defect through crystallization of the material. It was of ruder workmanship. The great rarity of implements of stone in the shell heaps was commented

⁴ Positive identification as to material has been found impossible without mutilation of specimen.

upon by Wyman, and the writer during his investigations has had no grounds to differ from Professor Wyman's opinion. The discovery of lance points at such a depth and of such graceful pattern is entirely without precedent. Specimens of the rude and thick arrow points ordinarily found in the shell heaps will be figured in a later paper.

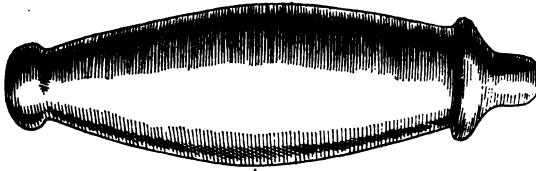


Fig. 12. (Full size.)

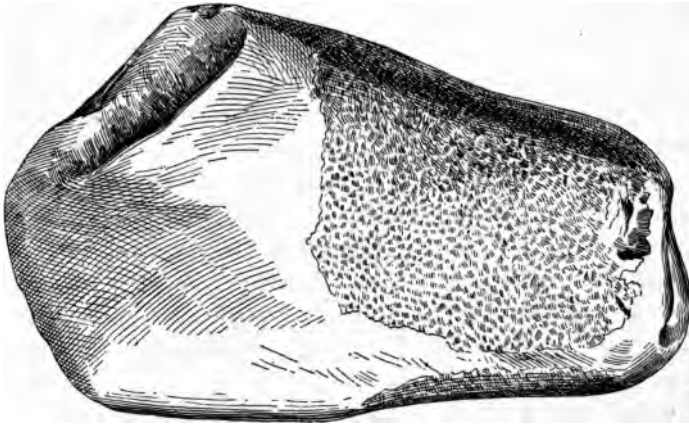


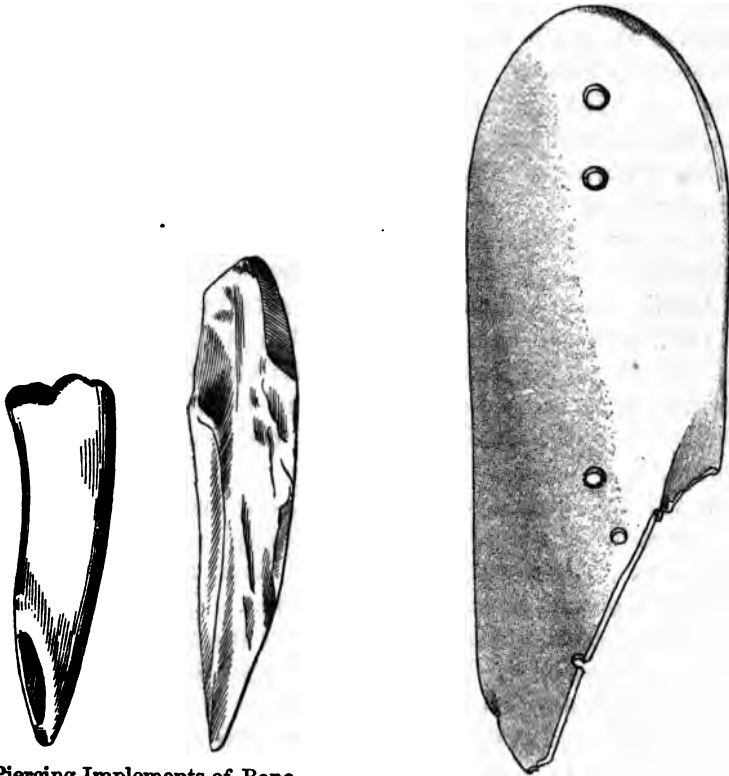
Fig. 13. (Full size.)

Throughout the excavations were found a number of pieces of red hematite, the largest being $3\frac{1}{2} \times 2\frac{3}{8} \times 2$ inches. This mineral was largely used as coloring matter in several of the burial mounds, notably at Mt. Royal where the whole upper stratum is dyed with it.

Shell.

As in the case of implements of bone, so of shell it may be said that Mulberry Mound among all the shell heaps of the St. John's has furnished the richest results to the archeologist.

At every depth were found gouges and scrapers of shell, many unbroken, and columellæ of fasciolaria, one $10\frac{1}{2}$ inches in length. Two and a quarter feet and five feet below the surface were found two drinking cups, formed from fulgur *perversum*, with portions of the side and the inner whorls removed, a form common enough on the surface and in the burial mounds, but very unusual at any depth in the shell deposits. Curiously enough, similar drinking cups wrought from the conch are in use to-day by the side of springs in some of the sea-board southern states.



Piercing Implements of Bone.
Mulberry Mound (full size).

Fig. 14. $\frac{1}{3}$ size.

Ten feet from the surface in perfect condition was a beautiful chisel fashioned from the lip of *strombus*.

Five feet from the surface was found a *cardium*, unbroken,

but giving evidence of wear upon the edge, and having a portion of the shell between the ridges removed. A *pecten*, without wear or work upon the edges, is figured in the annual report of the Bureau of Ethnology, 1880-1881, Plate XXI, Fig. 3. This particular shell is described as having served among the Indians as a receptacle for paint, and as coming from Santa Barbara, California. It is possible that the "cockle shell" from Mulberry Mound may have been used for the lining of pottery. At all events, the two central ridges could be put to such a purpose.

At a depth of 13 feet, 8 inches was found a portion of a gorget of shell, the part recovered being 6.04 inches in length, 2 inches in breadth, with an average thickness of .12 inch (Fig. 14). It bore three perforations for suspension or for attachment, and two smaller ones along the line of fracture, evidently corresponding with similar ones on the missing portion, arranged to allow of repair by binding, a method common at that period. The discovery of a gorget or any object of personal ornamentation is so unusual in a shell heap of the St. John's that particular stress deserves to be laid upon it. In fact, with the exception of one longitudinally perforated phalanx of a deer, from Salt Run (Marion Co.), no articles of personal adornment have been found by the writer in any shell heap of the St. John's beyond the limits of Mulberry Mound.⁴

At various distances from surface, one even so deep as 11 feet, were found six fulgurs, five of the species *carica* and one *perversum*. All were ground at the beak, and all with the exception of one *carica*, were perforated. Three of the species *carica* had single perforations below the angle and involving it, and one on the body whorl between the angle and the suture within an inch of the aperture.

The fulgur *perversum* had a small round perforation above the angle and two, one $\frac{1}{4}$ inch, the other $\frac{1}{8}$ inch, below. These perforations were considerably larger than the one above. The finding of the perforated fulgurs at so great a depth in a shell heap will, with other matters relating to these perforated shells, be referred to in Note A.

Human Remains.

Eleven feet from the surface, in immediate association with fragmentary bones of the lower animals, lay a portion of the shaft of a human femur $3\frac{1}{4}$ inches in length, with old breaks at either end; a portion of the shaft of a tibia, broken in excavation; two right heel bones, somewhat crushed; two bones of the toe; a fragment of a radius with old break, and a portion of rib. Five feet east of these remains lay a fragmentary portion of human femur, showing no recent fracture, while at the same level, but four feet distant, in the southeast corner of excavation 3 lay a fragment of femur; an ulna in two portions, old break; a small fragment of lower jaw and a piece of femur with old longitudinal split. At about the same level in the northwestern portion of the excavation, apparently entirely isolated, was the upper half of a human ulna. In view of the scattered and broken condition of these bones and their association with the bones of animals used for food together with the fact that an almost contiguous burial mound offered a means of sepulture, it seems unlikely that these human remains are other than refuse left over from a cannibalistic repast. Never elsewhere on the St. John's has the writer come upon human remains in this condition at a depth from the surface greater than 3 feet, and in his introductory paper, written previous to a second visit to Mulberry Mound, he stated that in view of the numerous cases indicating cannibalism discovered by him along the greater portion of the river where shell heaps exist, at no great depth from the surface, he was inclined to the belief that the custom must have come in at a somewhat late period of the formation of the shell heaps. Subsequent research may prove this supposition unfounded, but for reasons to be mentioned later the presence of human remains in this condition in Mulberry Mound does not modify his previously expressed opinion.

Remains of Lower Animals.

As is the case in the majority of shell heaps, the deer and turtle in Mulberry Mound were found, next to shell fish, to

have been the most staple articles of diet. In addition to a number of small fragments unidentified, were found bones of the alligator, of the raccoon, of the turtle, of the black bear, of the red lynx (a jaw), of the catfish and of the gar. Also a curious bone identified by Professor Cope as supporting the dorsal fin in a member of the sheep's head family. The jaw of the red lynx, an animal hitherto unreported in the shell heaps of the St. John's, was submitted to Professor Cope for identification.

NOTE A.

Perforated Fulgurs.

The fulgur, sometimes termed the busycon, popularly known as the conch, was a shell extensively in use among the aborigines. If specimens of the two species of fulgur most commonly found on the St. John's River are held facing the investigator the shell having the aperture to his right is termed *carica*, to his left, *perversum*. Fulgurs with artificially ground beaks and with circular or oval perforations evenly made are comparatively numerous upon the surface of the territory bordering the St. John's River. They are seldom at a greater depth in the shell heaps than can be reached by the plow. Their superficial position was noticed and commented upon by Wyman (Fresh Water Shell Mounds of the St. John's River, Florida, page 58 and Plate VIII, Fig. 2). They are, however, occasionally found in the burial mounds of sand at depths excluding the idea of an intrusive deposit.⁵ With the exception of Mulberry Mound, no shell heap in the writer's

⁴ Wyman figures two perforated objects from the shell heaps, and the writer has a considerable number of the phalanges of the deer perforated longitudinally, ploughed up and presented to him by Mr. Charles Dillard of Volusia. He is also indebted to Mr. McAllister of Bluffton, Volusia Co., for the fossil tooth of a shark, perforated laterally, found superficially in the shell deposit at that place.

⁵ This is particularly true of the great mound at Mt. Royal, Putnam Co., where in one trench among a number made, no less than 1307 fulgurs were found by the writer. A very small percentage, however, were evenly perforated in the manner of the shells under discussion. The great majority were of the species *perversum*. Some were unbroken, but the greater number were apparently intentionally mutilated in the manner of mortuary pottery by having a piece roughly knocked out.

investigations has yielded perforated conchs at a considerable depth, and as the territory bordering the St. John's has been carefully searched by the writer, having in mind the investigation of these perforated fulgurs, he is strongly inclined to the belief that the employment of these implements came in at a period subsequent to or approaching the abandonment of the great majority of the shell heaps of the river.

The use of these perforated fulgurs is not determined. Wyman confessed himself in doubt. In "Art in Shell," Bureau of Ethnology, Annual Report, 1880-1881, Professor Holmes figures a perforated fulgur (Plate XXVII) and cites Rau, "Archæological Collection of the National Museum," page 67: "It further appears that the Florida Indians applied shells of the *busycon perversum* as clubs or *casse-tetes* by adapting them to be used with a handle, which was made to pass transversely through the shell. This was effected by a hole pierced in the outer wall of the last whorl in such a manner as to be somewhat to the left of the columella, while a notch in the outer lip, corresponding to the hole, confined the handle or stick between the outer edge of the lip and inner edge of the columella. * * * * A hole was also made in the posterior surface of the spire behind the carina in the last whorl, evidently for receiving a ligature by means of which the shell was more firmly lashed to the handle."

Of scores of perforated fulgurs from the river, examined by the writer, he can recall but two wrought from the fulgur *perversum*. The fulgur *carica* is a more massive shell and better fitted for the rough work than the more slender *perversum* from which shell the drinking cups of the river shell heaps and mounds are fashioned. It is true that a heavy variety of *perversum* is met with on the coast, and that the fulgur *carica* is rarely, if ever, found on the west coast or on the east coast south of Jupiter inlet.⁶

In the coast shell heaps alone is the perforated fulgur *perversum* found to any extent, and this point should be remem-

⁶The Academy of Natural Sciences possesses no fulgurs of the species *carica* from the west coast. The Smithsonian has one, stated to be from Cedar Keys; its record is not well established.

bered when perforated fulgurs of Florida are under discussion.

In the river shell heaps a very small percentage of perforated shells have a notch in the outer lip, while absolutely none has a perforation in the spire, if we consider the spire to be that portion of the shell surrounding the apex, bounded by the suture. Moreover, a considerable majority of the perforated shells have but one hole, that being in the body whorl between the angle and the suture, from one to two inches to the right of the aperture. A certain percentage of fulgurs have the perforation below the shoulder, or angle, but frequently in such a position that if hafted, the ground beak of the shell would not be at right angles with the handle, and occasionally the perforation is so placed that a handle entering the aperture could not reach it. In other cases, perforations are disproportionately small and oval in shape, unfitted to receive a handle suitable for the rough usage of a war club. In the writer's collection are two good sized fulgurs with perforations .54 inch by .76 inch, and .86 inch by .56 inch. Many perforated fulgurs with ground beaks are of a size to set aside the hypothesis of their employment for any purpose where weight is an important factor. Of these the writer has one weighing but eight ounces, while another is but $2\frac{1}{4}$ inches in length. Occasionally fulgurs are seen with perforations in the body whorl above and below the shoulder, and it is probable that these are the ones referred to by Rau with a misapprehension as to the location of the spire. Again, other fulgurs are found with a single perforation between the angle and the suture, having two below the shoulder and equidistant from it. A fulgur *perversum* of this character, was taken by the writer from the historic mound at Mt. Royal, Putnam County.

Some fulgurs with ground beaks are imperforate, while others with perforations show grinding or wear where not alone the beak is involved but a portion of the lip. Other shells give evidence of considerable wear on the margin of the perforation toward the upper and lower portion of the shell, showing that the implement was not securely hafted and that it was subjected to continuous use. Others are polished on

the spire and body whorl above the periphery as though held in the hand.

From all this it is evident that while certain perforated fulgurs may have served for war clubs the great majority did not. Mr. Douglass, who is so familiar with the east coast of Florida, believes some of them to have served as hoes, and in this he is doubtless right. Probably, as is the case with most aboriginal implements, their use was various.

Conclusions.

At no point in the excavations at Mulberry Mound were whole shells found in any numbers, the heap having grown apparently from the beginning by the slow accretion of refuse from the meals of the few families living upon it and been solidly packed beneath their feet. It is apparent that such should be the case, since solid ground is too far distant to admit of the hypothesis that the mound was made through contributions of others not living upon its immediate surface. That a considerable time was required to pile so great a mass of shell to such a height through the agency of comparatively few there can be no reason to doubt. And yet the writer is convinced that of all the shell heaps investigated by him and by Professor Wyman the shell heap at Mulberry Mound is the most recent, and that it was still in process of formation when many others were abandoned, at least for use as refuse heaps. This belief is based upon the marvelous variety of the implements of bone, so infrequent in the other mounds, and patterns heretofore unreported from other localities on the river. The presence of delicately wrought lance heads near the base; of colored and of stamped pottery at considerable depths; of fulgurs at a distance from the surface; of a carefully made gorget of shell; the discovery of an implement of polished stone, a fact previously unheard of in the river shell heaps, and fragmentary human bones a number of feet from the surface, found only superficially by the writer in numerous other shell heaps, when taken together, argue for Mulberry Mound an origin posterior to other shell heaps of the St. John's hitherto explored. It will be noted, however, that nothing found in this shell heap indicated a knowledge of Europeans or in any way pointed to its formation in post-Columbian times.

CERTAIN SHELL HEAPS OF THE ST. JOHN'S RIVER,
FLORIDA, HITHERTO UNEXPLORED.

BY CLARENCE BLOOMFIELD MOORE.

Fifth Paper.

GENERAL CONCLUSIONS.

STONE IN THE SHELL HEAPS.

It will be remembered that the district drained by the St. John's River is destitute of stone; the "rock" of the Indian River, which stream is closely approached by the St. John's near the headwaters of the latter, being a conglomerate entirely unsuitable for the manufacture of piercing or cutting implements.

It will be remembered also that in the shell-heaps of the river, even those giving evidence of greatest antiquity through absence of pottery, through infrequent occurrence of anything denoting the agency of man, and through other indications, implements of stone, though infrequent, have been found at all depths. Professor Wyman was present at the finding at the base of the shell-heap at Horse Landing, (Putman Co.,) of a piece of flint rudely worked, which he pronounced contemporary with the earliest stage of the mound. The writer realizing the importance of this discovery in a shell-heap in which, so far as Professor Wyman's and his own investigations have resulted, no pottery exists, twice visited Horse Landing and made a careful examination of the bluff. The flint in question was found in a section of a shell-heap laid bare by the action of the river, and the writer entertained the idea that the implement was possibly from the talus at the foot of the bluff, in which event the value of the find would have been materially lessened, if not entirely nullified. Fortunately, of all the shell-heaps of the river the composition of that at Horse Landing, most readily lends itself to an accurate estimate of the authenticity of objects found. Unlike the majority of the river shell-heaps, that at Horse Landing does

not rise from the level of the water, but is piled upon a bank of sand a number of feet above the river. All debris from the section laid bare falls a distance below the shell deposit, and an implement found embedded at a point in the sand where the shell begins is considerably above the debris from the section, and must, in the writer's opinion, have occupied that position since the foundation of the shell-heap.

During the investigations of the writer, which covered a period of upward of seven months during the years 1892--1893, steam motive power reducing to a minimum time devoted to transit, several hundred excavations were made in upward of eighty localities. But a small number of objects of stone were discovered under conditions positively identifying them as being contemporary with the construction of the heaps; a number entirely disproportionate, one would think, to the amount of material displaced.

Before proceeding to a detailed account of the worked stone found by the writer in the shell-heaps of the St. John's, it may be well to specify the nature of the conditions referred to above. The writer has had occasion to state in previous papers of this series that the shell-heaps were occupied as a place of residence by later Indians, and that some at least were cultivated by them. The maximum depth of a furrow in a shell-heap is eight inches, and it is probable that the rude implements of the Indians went no deeper. Allowing ten inches as a maximum deposit of surface loam since the final abandonment of the mound, a depth of eighteen inches is arrived at, lower than which it is necessary to go to insure a satisfactory identification as to the period to which any implement belongs.

If, however, sweet oranges are growing upon the shell-heap it is necessary that even a greater depth be attained. It is believed that the sour orange trees, so numerous upon many of the shell-heaps, are descended from sweet trees run wild, planted by later Indians from seed furnished by the Spaniards. Be this as it may a majority of the shell-heaps north of Lake Harney were until a comparatively recent date thickly covered with a growth of sour orange trees. It has been found in Florida that the most available orange trees are derived from

sweet budding upon sour orange stock. After this is accomplished it becomes necessary to place the trees in line and to remove many that no tree may be deprived of sunlight. For the removal of trees and for the "lining" of others, pits three feet in depth are necessary. It is well, therefore, to bear in mind that implements unquestionably of the shell-heaps must be found at a depth greater than three feet in sweet orange groves, and over eighteen inches from the surface in shell deposits not utilized for the cultivation of the orange. The writer, while handling the spade in an orange grove at St.

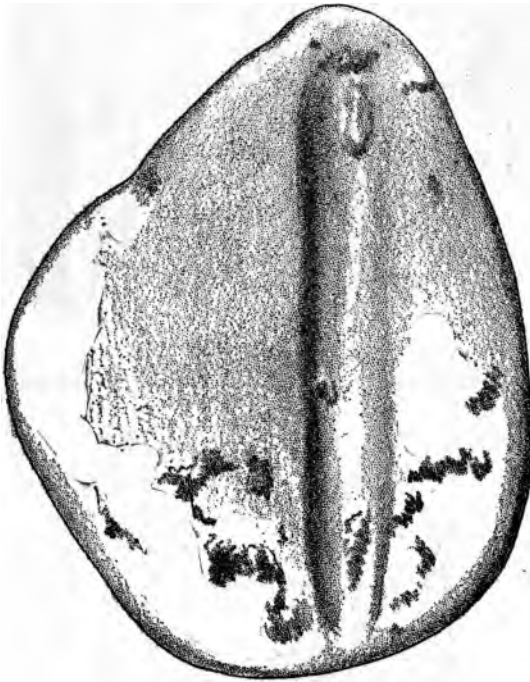


Figure 1.—Grooved Sandstone Hone. (Actual size).

Francis, found at a depth of three feet a thin and beautifully proportioned arrow head, evidently of the time of the later Indians, and conversely he has seen upon the surface in orange groves, arrow points unquestionably of the time of the shell-heaps.

Stone implements known as "sinkers" have never been met with by the writer other than superficially, though hones of sandstone with grooves worn by the friction of pointed tools were contemporary with the later heaps at least. Fig. 1 is from Turtle Mound,¹ Brevard Co.

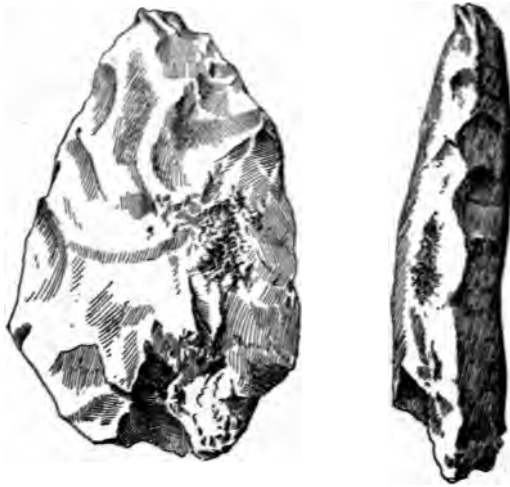


Figure 2.—Arrow Head, Morrison's Creek. (Actual size).



Figure 3.—Arrow Head, Mt. Taylor. (Actual size).

No grooved axes are known to have been found on the river under any circumstances.

¹Not the great marine shell-heap near New Smyrna.

During the entire investigation of the writer but one implement in any way resembling a chisel or hatchet was brought to light, that could positively be ascribed to the period of the

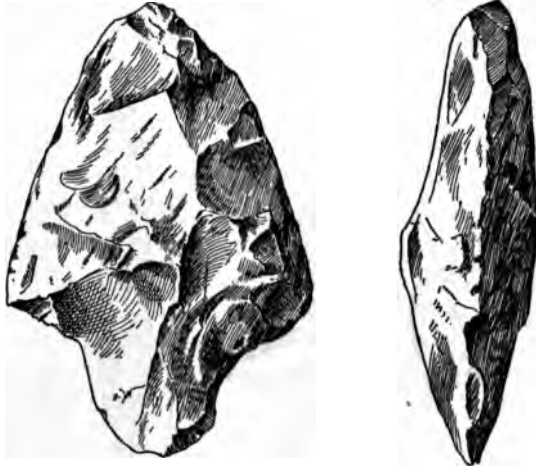


Figure 4.—Arrow Head, Ginn's Grove. (Actual size).

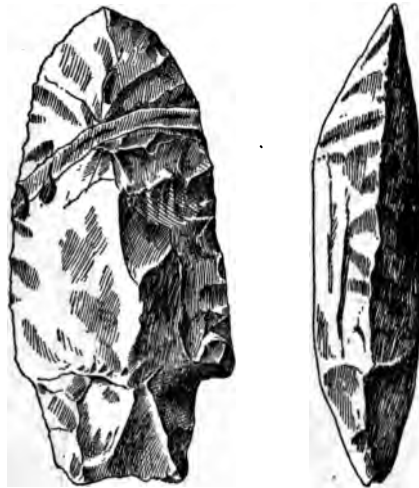


Figure 5.—Arrow Head, St. Francis. (Actual size).

shell-heaps. This was an implement of polished greenstone figured and described in the *AMERICAN NATURALIST*, August,

1893. This object, the only one of polished stone known to belong to the epoch of the shell-heaps of the St. John's, was found at a depth of $4\frac{1}{2}$ feet from the surface in Mulberry Mound, Orange County, which is believed to be one of the very latest shell-heaps of the river.

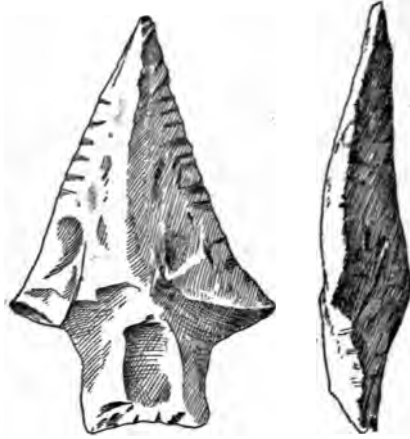


Figure 6.—Arrow Head, shell-heap near Puzzle Lake. (Actual size).

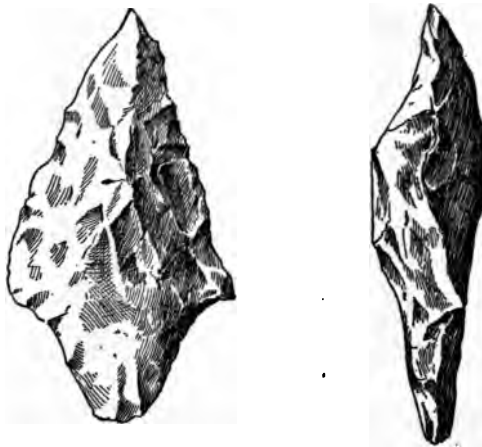


Figure 7.—Arrow Head, Bryson's Mound. (Actual size).

ARROW AND SPEAR POINTS CONTEMPORARY WITH THE
SHELL HEAPS.

FOUND IN PLACE BY THE WRITER.

- 1.—Two arrow heads of chert from the swamp shell-heap near Morrison's Creek, (Volusia Co.,) lying on fire-place four feet eight inches from the surface.² Of these, one is figured (Fig. 2). Though carried to a depth of nine and one half feet, this excavation showed no pottery below two feet from the surface.
- 2.—Two arrow heads of chert and one of chalcedony from the great swamp shell-heap near Volusia, known as Mt. Taylor, (Volusia Co.,) respectively four and one-half (Fig. 3), six and one half and eight feet from the surface. All three lay upon fire-places. A careful search in many parts of this shell-heap showed no pottery whatever.
- 3.—One arrow head of chert at Ginn's Grove, (Orange Co.,) five miles south of Sanford, at a depth of two feet (Fig. 4). No orange trees grow on this deposit. No pottery found in it, though comparatively abundant in an adjacent shell field.
- 4.—One arrow head of chalcedony at a depth of six feet on a fire-place in the crescentic shell-heap at St. Francis, (Old Town), (Lake Co.,) (Fig. 5). Many excavations showed no pottery below four and one half feet from the surface.
- 5.—One arrow head of chert six and one half feet from surface on fire-place in shell-heap west side of Puzzle Lake, (Orange Co.,) (Fig 6). No pottery found below a depth of two feet.
- 6.—A fragment of spear head of chalcedony at Orange Mound, (Orange Co.,) about twenty-one miles by water

²It will be seen that a majority of the arrow heads were found immediately upon fire-places, and of the remainder, the writer is unable to state that such was not also the case. With some were the bones of lower animals. It has been suggested to the writer that as it is unlikely that weapons so comparatively scarce as were arrow points at the period of the shell-heaps, should be lost without some reason, the stone points met with by him were thrown on the fire-places buried in the carcasses of animals. This seems a not unlikely hypothesis.

south of Lake Harney. Deep and numerous excavations gave no pottery below seven and one half feet.

- 7.—One arrow head of chalcedony in Bryson's Mound, (Volusia Co.,) (Fig. 7). This arrow head was not found when thrown out, but as it lay among material belonging to a stratum not seen within three feet of the surface, its depth may be set down at from three to five and one half feet. Sour orange trees only.
- 8.—One spear head of bluish chert in the shell-heap on Salt Run, Lake George, (Marion Co.,) at the bottom of the heap three and one half feet from the surface. No pottery found anywhere in this shell-heap below surface loam. No orange trees.
- 9.—One arrow or spear head of hornstone beveled on both sides 2.34 inches long with maximum thickness of .47 inch, four feet from surface in conical shell-heap in swamp one mile north of Astor, (Lake Co.,) near fire-place. No pottery discovered in this mound beneath surface loam.
- 10.—Three lance heads about fourteen feet from surface in Mulberry Mound, (Orange Co.). Two of fine chert, thin and of graceful pattern; one of somewhat ruder workmanship fashioned from coarse, yellow chert. These lance points have been described in a previous paper and many reasons adduced why Mulberry Mound must be considered among the very latest of the shell-heaps. Ornamented pottery was found to water level.

As will be seen by the figures, the arrow heads of the presumably earlier shell-heaps are rude in type. They are also characterized by unusual thickness.

Stone implements of the St. John's River are distinctly neolithic, though Professor Wyman in error characterized certain rough specimens found by him as of the St. Acheul type.³

The writer has submitted to Professor Haynes a representative collection of rude chipped implements of various sizes, presented to him and reported as coming from the shell-heaps by owners of orange groves and other responsible persons.

³Fresh Water Shell Mounds of the St. John's River, Florida, page 49,

These implements Professor Haynes carefully studied, and writes of them as follows:

"No one of them, in my judgment, resembles the genuine paleolithic implements of western Europe, and I am no believer in any paleolithic period in North America different from that of the old world. By this I mean a time when man was living in some regions as the contemporary of animals, now extinct or migrated to colder countries, like the mammoth and reindeer, and had for his principal tool a type of stone implement peculiar in its shape and method of fabrication and of use. Such implements also show upon their surface characteristic indications of their great antiquity. I think genuine paleolithic implements, so understood, have been discovered in the United States, but yours do not fall within that category, in my opinion, although they somewhat resemble them in shape. But so also do many objects found all over our country which must, nevertheless, be classed as rude, or unfinished Indian implements, although they have been supposed to be like genuine paleolithic implements, by some persons not sufficiently informed upon the subject."

FOOD SUPPLY.

While dredging for specimens of modern shells in the lakes, creeks and lagoons in the neighborhood of the St. John's River, the writer had ample proof that the supply of paludinæ is greater at the present time than has previously been reported. Whole lake bottoms are covered with them, while they are found in abundance in numerous creeks and lagoons. The writer knows by experience that the ampullaria and the paludina make a nourishing and not unpalatable soup. Still it is probable that the aborigines varied their diet to as great an extent as possible. Bones of the dog, the red lynx and a member of the sheepshead family of fish, hitherto unreported as articles of diet, were discovered in shell-heaps by the writer.

It is difficult to arrive at a conclusion in respect to the bison, known to have inhabited Florida within a period of which there is historical record. No bones belonging to this animal were found by Professor Wyman, nor has the

writer succeeded in discovering any. A molar, identified by Professor Cope as belonging to a bison, was presented to the writer by Mr. C. H. Curtis of Bluffton, Volusia Co., who stated that it had been superficially found on the shell deposit at that place. It is possible that future investigation will show the bones of the bison to be present in the shell-heaps of the St. John's. Their presence in those of Georgia has been noted.⁴

While the remains of various fish are found in the shell deposits they are by no means so numerous as might be supposed considering their great abundance in the river. The absence at any considerable depth of "sinkers" of stone, believed to have been used for cast-nets, as has been stated, seems to indicate their use as confined to the close of the shell-heap period. Nothing in any way suggesting a fish hook has ever been found in the river heaps. It is probable that the main supply of fish was obtained through the medium of the spear, a method known to have been practiced by later Indians.⁵

AGE OF THE SHELL HEAPS.

There seems to be no reason to doubt that a wide divergence in time characterizes the construction of the shell-heaps of the river, and that many were completed before others were begun. Mt. Taylor, Volusia Co., has a maximum height of over 27 feet. Many and considerable excavations made in every part with an adequate force of men have failed to reveal a fragment of pottery beneath the surface loam. The removal of the entire heap (a work of months) could alone afford absolute proof, but the result of repeated excavations is a strong indication of absence of pottery in the mound.

Mulberry Mound near Lake Poinsett, an island shell-heap rising 16 feet above the water level, is composed of crushed shell and sandy loam, showing slow growth beneath the tread of its inhabitants. Ornamented sherds were met with to the very bottom. Colored pottery was found, and an article of personal adornment, while on a preceeding page has been

⁴C. C. Jones "Antiquities of the Southern Indian," page 200.

⁵The writer has found iron fish spears near the surface of the sand mounds.

related how graceful weapons lay near the base—weapons entirely at variance with the pattern of those of presumably older mounds. The men who dropped the first unios on the low marsh where Mulberry Mound now stands, probably came long after the aborigines abandoned Mt. Taylor. One can readily realize, then, that the shell-heaps are by no means contemporary, and that the beginning of the earliest must date from a period comparatively remote, not, so far as any proofs exist, from a time approaching that of the great mammals, but one far antedating the coming of the whites.

Since the appearance of the first paper of this series, the writer has (1893) carefully gone over many shell-heaps included in his first paper, and has added to the list a considerable number from seven localities. With a force of eight men to handle the spades, the writer has in addition carefully examined nearly all the shell-heaps described by Wyman, and in none has he found any indication of intercourse with Europeans, in this result coinciding with the researches of Professor Wyman.

Numerous objects found by those having shell-heaps under cultivation have been described to or inspected by the writer, but in no case has there been any evidence of the discovery of anything suggesting other than the product of unaided aboriginal industry.

History is singularly rich in accounts of the manners and customs of the natives of Florida, beginning at a period not long subsequent to the landing of Columbus. In all these accounts, written with scrupulous regard for detail, there is nothing to indicate the existence of native races so low in the scale of humanity as must have been those who piled up the greater portion of the shell-heaps. We are told by the Knight of Elvas⁶ of the superior quality of the pottery of the Southern Indians. We look in vain in the shell-heaps for evidence upon which such an assertion could have been based. In the face of such a mass of negative evidence, unless proof to the contrary be adduced, the shell-heaps must be considered as abandoned in pre-Columbian times.

A point brought forward in the initial paper of this series

⁶Cited by C. C. Jones "Antiquities of the Southern Indians," page 445.



for the sake of emphasis will be repeated here. In certain shell-heaps at various depths from the surface fragments of pottery, which have gradually been decreasing in number, entirely disappear, indicating, in the writer's opinion, the inception of the manufacture of pottery during the progress of the erection of the heap. The absence of pottery cannot be accounted for under the hypothesis of decay, since no stratum containing partially decayed sherds is met with in any of the river shell-heaps. If the occurrence of shell-heaps devoid of pottery is admitted on the St. John's, and as to this a careful investigation can leave no doubt, it would be difficult to assign a reason for the absence of this necessity of aboriginal life, save ignorance of the method of its manufacture,⁷ and assuming this to be the case, there would seem to be no cause why certain shell-heaps should not show by internal evidence the inception of the art.

In conclusion, the writer would state as his opinion, that while the shell-heaps of the St. John's have been imperfectly explored, and while many interesting questions still remain unanswered, but little work will be done in connection with them in the near future. The territory to be covered is so vast, and the shell-heaps of the upper river are so inaccessible that one may well hesitate before undertaking an exploration involving so much trouble and expense. Moreover, but little is found in comparison with the vast quantities of debris to be handled, and the relics of the wretched makers of the shell-heaps offer but a poor incentive in comparison to the more alluring results to be attained in other portions of the country.

⁷It has been asserted that the absence of pottery in certain shell-heaps is explainable under the hypothesis that the people frequenting the shell-heaps dwelt there for but a portion of each year and made the earthenware vessels elsewhere. This seems untenable. It matters little where the pottery was made. If possessed by the occupants of the shell-heaps it certainly would be *used* there, for numerous fire-places and broken bones at all depths testify to culinary pursuits. Earthenware is too brittle to allow one for an instant to suppose that numerous vessels would not be broken as they were on so many shell-heaps. Moreover it is difficult to comprehend why some shell-heaps should be marked by the manufacture of earthenware, while others give no evidence of its production. Rude masses of baked clay and in one case a vessel filled with clay unbaked were found by the writer in shell-heaps.

The conclusion seems difficult to escape that where earthenware is not found, its manufacture was unknown.

Reprinted from *The American Naturalist*, January 1st, 1894.

U of M

870

1000

1700

ARCHEOLOGY AND ETHNOLOGY.¹

Tobacco pipes in Shell-heaps of the St. John's.—By those familiar with the archeology of Florida, it will be remembered that the extended and careful researches of Professor Wyman among many of the shell-heaps of the St. John's river yielded no pipes, fragmentary or otherwise, intended for the smoking of tobacco, and that naturally the conclusion was arrived at by him that in all probability the makers of the shell-heaps were ignorant of its use.²

During the first two years of our investigations on the St. John's the negative results obtained by Professor Wyman awaited us also, though at the conclusion of our third season, in the island shell-heap constituting Mulberry Mound,³ on the southern border of Orange County, near Lake Poinsett, we discovered at considerable depth from the surface a fragment of a tube of earthenware, which we believed, and which was pronounced by competent authority, in all probability to be a portion of a pipe used for the smoking of tobacco.

In the small burial mound situate on the northern extremity of the shell-heap we found two other fragments still more markedly indicating a similar use when entire. Nevertheless, the shell-heap fragment and those from the burial mound, assuming the contemporaneity of the two, while strong evidence as to the presence of tobacco pipes in the shell-heaps, were not final.

At the close of our fourth and last season of investigation of the river mounds (April, 1894) we again visited Mulberry Mound, making an excavation about 16 by 24 feet and 16.5 feet in depth to the water level.

At a depth of 6 feet from the surface was discovered a tobacco pipe of earthenware, complete in every part, of which we give a representation. (Plate XVII.)

Thus we have positive evidence that the men under whose feet slowly grew the great mass of powdered shell and other kitchen refuse now known as Mulberry Mound were familiar with the use of tobacco.

It is fair to explain, however, as we have previously stated in the *NATURALIST*, that Mulberry Mound is by no means a type of the shell-heaps of the river, since the debris of which it is composed is compara-

¹ This department is edited by H. C. Mercer, University of Pennsylvania.

² "Fresh Water Shell Mounds of the St. John's River, Florida," page 59.

³ *Naturalist*, Aug. 1, 1893.